EFFECT OF QUALITY IMPROVEMENT INITIATIVE ON UMBILICAL LINE ASSOCIATED BLOOD STREAM INFECTION IN NEONATAL INTENSIVE CARE UNIT

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Dedicated

to

my Family,

friends

&

Teachers

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ABBREVIATIONS

BSI	Blood stream infections
CAUTI	Catheter associated Urinary tract infections
CLABSI	Central line associated blood stream infections
CoNS	Coagulase negative Staphylococci
CRBSI	Catheter related blood stream infections
CVC	Central venous catheter
HAI	Hospital Acquired infections
HCAI	Healthcare associated infections
HH	Hand Hygiene
NICU	Neonatal Intensive care unit
PICC	Peripherally inserted central catheter
QI	Quality Improvement
UAC	Umbilical arterial catheter
ULABSI	Umbilical line associated blood stream infections
UVC	Umbilical Venous catheter

ABSTRACT

Introduction: Umbilical Line Catheterisation is the most common healthcare associated infection in Neonatal Intensive Care Unit imposing significant burden on affected neonate and on healthcare system. Umbilical catheter insertion and stay introduces risk of infection, increased hospitalisation stay and costs. Due to many factors in low-resource countries, umbilical line associated blood stream infections (ULABSI) are unaddressed and under-reported.

Aim and Objectives: To assess the Effects of QI Initiative on ULABSI in Neonatal Intensive Care Unit and factors causing umbilical line associated infections

Materials & methods: Prospective cohort study of neonates in whom umbilical line was inserted during NICU stay from March, 2021 to February, 2022. The study will be conducted in 2 phases in which phase I would be data collection (3 months). Phase II will be intervention period of 9 months. Implementation and sustenance were ensured by Plan-Do-Study-Act cycles.

Results: - Total of 101 neonates, 30 neonates in Phase I and 71 neonates in Phase II with total of 41 females and 60 males were enrolled in this study. Significant improvement was seen in hand hygiene compliance improved from 90% to 94% and with adequate time 0 to 85.7% then to 100%, sterile field maintenance throughout procedure from 78.6% to 90.9%, compromise of sterile field during readjustment reduced (from 35.7% to 3.2%). SOP of intravenous line maintenance based on ANTT could be implemented and sustained throughout for 9 months. Overall improvement in compliance to ANTT principles in the intravenous line maintenance followed a gradual decrease in HCAI in the unit from 6.9 per 1000 patient days to 3.4 and subsequently to 0.0 per 1000 patient days (median) over 9 months.

Conclusion:- This study demonstrates the effectiveness of quality improvement initiative on umbilical line associated blood stream infection in neonatal intensive care unit. Using a quality improvement model of improvement, ANTT in intravenous line maintenance was implemented stepwise.

Keywords: ULABSI, hand hygiene, ANTT (Aseptic non touch technique), neonates, Neonatal Intensive Care Unit.

TABLE OF CONTENTS

S. NO.	TOPIC	PAGES
I	INTRODUCTION	1-5
II	AIMS AND OBJECTIVES	6
III	REVIEW OF LITERATURE	7-20
IV	MATERIALS AND METHODS	21-32
V	OBSERVATIONS AND RESULTS	33-128
VI	DISCUSSION	129-134
VII	SUMMARY AND CONCLUSIONS	135
VIII	BIBLIOGRAPHY	136-142
	APPENDICES – I - PROFORMA - MASTER CHART	
	APPENDICES – II - APPROVAL LETTER OF THESIS PLAN - THESIS PLAN	

LIST OF TABLES

Table No.	Title	Page No.
1.	PDSA cycles	26
2.	Age group	33
3.	Gender	34
4.	Gestational age	35
5.	Type of delivery	36
6.	Asphyxia	37
7.	Cry	38
8.	Feeding	39
9.	Indication Of Insertion Of Umbilical Line	40
10.	Umbilical Line Inserted By	41
11.	Time taken to insert umbilical line (minute)	42
12.	No of days of Umbilical line	43
13.	Umbilical line rate	44
14.	Baseline charaterstics	45
15.	Respiratory and CNS involvement	51
16.	Period of Mechanical Ventilation	53
17.	Haematological and Metabolic Diseases	57
18.	Diseases Related to prematurity	59
19.	Sepsis and other systems	62
20.	Cardiovascular system involvement	65
21.	Descriptive Statistics	67
22.	Hand wash	70

23.	Procedure Checklist 1	73
24.	Procedure checklist 2	76
25.	Blood culture	87
26.	Umbilical Catheter Tip Culture	88
27.	Antimicrobial susceptibility profile of gram negative bacteria Numerator:- drugs sensitive	89
28.	Antimicrobial susceptibility profile of gram positive bacteria	91
29.	Antifungal Susceptibility Profile of Candida spp.	93
30.	Insertion cart list	94
31.	Insertion cart checklist	105
32.	Outcome	112
33.	Procedure checklist 3	114
34.	Difference between phase I and phase II	120
35.A	PDSA results	121
36.B	PDSA result	126

LIST OF FIGURES

Fig. No.	Title	Page No.
1.	Root Cause Analysis for ULABSI	24
2.	Age Group	33
3.	Gender	34
4.	Gestational age	35
5.	Type of delivery	36
6.	Asphyxia	37
7.	Cry	38
8.	Feeding	39
9.	Indication Of Insertion Of Umbilical Line	40
10.	Umbilical Line Inserted By	41
11.	Time taken to insert Umbilical line	42
12.	No of days of Umbilical line	43
13.	Umbilical line rate	44
14.	Twins	46
15.	Term	46
16.	Extreme preterm	47
17.	Early Preterm	47
18.	Appropriate For Gestational Age	48
19.	Small for gestational Age (SGA)	48
20.	Large for gestational age (LGA)	49
21.	Low Birth Weight (LBW)	49
22.	Very Low Birth Weight (VLBW)	50

23.	Extremely low birth weight (ELBW)	50
24.	Respiratory Failure	52
25.	Period Of Mechanical Ventilation	53
26.	Respiratory Distress Syndrome	54
27.	Persistent pulmonary Hypertension (PPHN)	54
28.	Congenital Pneumonia	55
29.	Seizures	55
30.	Perinatal Asyphxia (PNA)	56
31.	Asympomatic Polycythemia	57
32.	Asymptomatic Hypoglycemia	58
33.	Anemia Of Prematurity	59
34.	Apnea Of Prematurity	60
35.	Oedema Of Prematurity	60
36.	Hyponatremia Of Prematurity	61
37.	Early Onset Sepsis	62
38.	Late onset sepsis	63
39.	Neonatal Hyperbilirubinemia	64
40.	Shock	66
41.	Descriptive Statistics	68
42.	Hand wash done	70
43.	Hand wash adequate time for hand hygiene	71
44.	Hand wash Adequate Time For Hand Hygiene	72
45.	Heparin Connected To Umbilical Artery Line	74
46.	Periodical Checks For Local Signs Of Inflammationswelling	74

47.	Watch For Lower Limb Colour And Perfusion	75
48.	Assemble equipment/verify supplies	75
49.	Inform Radiology	78
50.	Position Patient Correctly For Procedure	79
51.	Wear Sterile Gown And Gloves	79
52.	Drape A Large Area Exposing ONLY Site	80
53.	Prepare Site With 2% Chlorhexidine/4% Alcohol Solution	80
54.	Prepare Site For 30 Seconds	81
55.	Dry For Up To 60 Seconds Without Fanning/Wiping	81
56.	Maintain Sterile Field Throughout Procedure	82
57.	Done After Reminder	82
58.	Did the assistant follow the same precautions? (Hand washing, mask, gloves and gown)	83
59.	Done After Reminder (Hand washing, mask, gloves and gown)	83
60.	Was Sterility Maintained When Applying Dressing/ Stitches?	84
61.	Was sterile field compromised during line readjustment?	84
62.	Done After Reminder sterile field	85
63.	Were IV fluids/lines being attached aseptically?	85
64.	Is the umbilical line dressing changed routinely?	86
65.	Blood culture	87
66.	Umbilical Catheter Tip Culture	88
67.	Antimicrobial susceptibility profile of gram negative bacteria	90
68.	Antimicrobial susceptibility profile of gram positive bacteria	92
69.	Antifungal Susceptibility Profile of *Candida spp*.	93
70.	Top shelf Sterile Towels	96

71.	Sterile Gowns	97
72.	Caps (in plastic bag)	97
73.	Masks	98
74.	UAC trays	98
75.	Bottom shelf- #6 Fr. Single Lumen Umbilical line	99
76.	#5 Fr. Single Lumen Umbilical line	99
77.	#3.5 Fr. Single Lumen Umbilical line	100
78.	#3 Fr. Single Lumen Umbilical line	100
79.	Drawers- sterile Gloves	101
80.	Measuring Tape	101
81.	0.9% NaCl Vial	102
82.	0.9% NaCl Pre-filled Syringe Package	102
83.	5 ml Syringe	103
84.	10 ml syringe	103
85.	Needles(22G, 27G)	104
86.	Catheter Introducer (22G, 24G)	104
87.	4”x4” Gauze	106
88.	2”x2” Gauze	107
89.	#3.0 Silk Suture	108
90.	Sterile Scissors and Tweezers set	108
91.	IV extension set	109
92.	Tegaderm small (4.4 cm x 4.4 cm)	109
93.	Tegaderm medium (6cm x 7cm)	110
94.	Tegaderm large (10cm x 12cm)	110

95.	Clamps, Non tooth, non sterile	111
96.	Alcohol for cleaning cart top	111
97.	Tapes	112
98.	Outcome	113
99.	Proper size of catheter inserted	115
100	Back flow checked	116
101	Washing Hands prior to touching the line	116
102	Closed system	117
103	Is The Line Being Placed Away From Potential Areas Of Contamination	117
104	Scrubbing Up And Down On The IV Tubing And Line?	118
105	Does The Nurse Wait For The Port To Dry After Swabbing Before Accessing?	118
106	Umbilical Line Dressing Changed Routinely	119
107	Umbilical line days/ 1000 patient days	126
108	Umbilical catheter tip culture/ 1000 line days	127

LIST OF PICTURES

Pic. No.	Title	Page No.
1.	Potential pathways and sources leading to central line-associated bloodstream infections. HCW, health care worker. Reprinted from Crnich et al. Clin Infect Dis 2002;34:1232-42, with permission of Oxford University Press.	9
2.	CLABSI prevention	27
3.	Fetal circulation	28
4.	Neonatal Sepsis	29
5.	Umbilical Access in neonates	30
6.	Group sessions	31
7.	Group session 2	32

INTRODUCTION

Umbilical line-associated bloodstream infections (ULABSIs) are the most frequent pediatric hospital-acquired infections and are associated with significant morbidity and healthcare costs. ULABSIs is an infection that occurs when any micro-organism enters the bloodstream through an umbilical line catheter. An umbilical line catheter is usually inserted by a healthcare professional to access an umbilical artery or vein to administer medications. The catheter, if in place for a longer period of time can lead to infections. Infections also lead to increased risk of morbidities such as necrotizing enterocolitis, bronchopulmonary dysplasia, retinopathy of prematurity, neurodevelopmental impairment, cerebral palsy and even death. Studies indicated that in neonatal ICUs (NICUs) CLABSI rates are nearly 36.2 CLABSIs/1,000 central line-days.[1] Inadequate nurse: patient ratios, unskilled health care providers and open intravenous infusion systems account for the higher incidence of CLABSIs and the subsequent morbidity and mortality in developing countries. Basic infection control measures are not systematically implemented due to lack of awareness and resources. The incidence of ULABSI is not only underestimated but also only limited data are available from resource-constraint countries like India.

Out of the most common type of errors, HAIs (Hospital Acquired Infections) are the major cause of significant number of deaths in hospitalized patients in India. Hospital acquired infections also known as healthcare associated infections are nosocomially acquired infections which are typically not present at the time of admission. These infections actually are acquired after hospitalization and manifest after 48 hours of hospital admission. HAIs include infections like surgical site infections (SSI), central line-associated bloodstream infections (CLABSI), catheter-associated urinary tract infections (CAUTI), Hospital-acquired Pneumonia (HAP), Ventilator-associated Pneumonia (VAP), and Clostridium difficile infections (CDI).An umbilical line *associated* bloodstream infection *(*ULABSI*)* is defined as *a* laboratory-confirmed bloodstream infection not related to

an infection at another site that develops within *48* hours of central line placement. A study done in intensive care units in Northern India shown that the overall rate of CLABSI was 17 per 1000 catheter-days and 14.21 per 1000 inpatient-days. Klebsiella pneumoniae was the most common organism (n = 22/55, 40%). Immunosuppressed state and duration of central line more than 10 days were significant factors for developing CLABSI. [2]

An umbilical line is defined as a catheter which transits through one of the two umbilical arteries or umbilical vein. Generally, UAC (Umbilical Artery Catheter) or UVC (Umbilical Venous Catheter) are used in NICU as it provides access to the neonates' central circulation. UAC/UVC lines can be placed at the time of birth and allow to quickly infuse fluids, inotropic drugs, and blood if required. There is increasing use of umbilical line catheters in NICUs which leads to disruption of integrity of skin allowing entry of micro-organisms leading to infections. There are many different ways that contamination can occur of the umbilical line and cause an umbilical line-related infection. These include: contamination on insertion, patient's skin flora, healthcare professional accessing the umbilical line, contaminated infusion or components of IV set, hematogenous spread from other sites (e.g. through the bloodstream from another infection) and non-intact dressing. There are patient-related risk factors for developing an umbilical line associated blood stream infection which include: immunosuppression, poor nutrition, impaired skin integrity, multiple invasive procedures, antibiotic therapy and parenteral nutrition Umbilical line related infections can be either localised or systemic. Symptoms of localised infections include: redness, swelling, discharge at umbilical line site. If localised infection is suspected, a swab can also be taken from the umbilical line site if exudate is present. Symptoms of systemic infection include: fever, hypotension, tachycardia, respiratory distress. All these can lead to severe bacteremia, sepsis and death. This all can be prevented by bridging the gap between knowing and implementing the central line care bundle. The central line care bundle is a collection of evidence-based interventions for intravascular central catheter patients, if

applied together as a package they provide better outcomes than when they are implemented individually. The central line care bundle is composed of five components, mainly: 1) Hand Hygiene, 2) Chlorhexidine skin antisepsis, 3) optimal catheter site selection, 4) maximal sterile barrier precautions, 5) daily review of line necessity.[3] The central line care bundle is most effective when all the mentioned elements are executed together and not singularly. The application of this approach has been demonstrated to reduce central line infection rates in many hospitals, with many ICUs that have implemented the multifaceted intervention having nearly eliminated CLABSI incidences.[4] The success of central line bundle approach has also been attributed to a combination of mindfulness that is developed when applying the key components mentioned above with particular reduction of blood stream infections development resulting from strict application of maximal sterile barrier precautions.[5]

One of the most effective method of decreasing the risk of ULABSI is proper hand hygiene. Hand hygiene has often been singled out as the most important measure in preventing hospital-acquired infection. However, hand hygiene compliance among medical staff remains low.

Neonates are at increased risk of infection because their host defense mechanisms are not mature. They also occupy an environment in which frequent use of antibiotics and invasive interventions often permit the invasion of common nosocomial pathogens, and the close proximity of patients in many NICUs facilitates transfer of organisms from patient to patient. The most common cause of spread of nosocomial infection in NICUs is by the hands of physicians, nurses, physiotherapists, and other hospital personnel.[6-9] Most studies on hand-washing intervention programs demonstrated that improvement was usually short term, and without ongoing audit, compliance tends to return to the baseline over a period of time.[9-11] In a study conducted in NICU of DMCH showed the hand hygiene compliance 90.9% in year 2021. Adherence with eight steps of hand hygiene results in definite decrease in infection rate. Whether washing the hands is done with water or with alcohol based waterless hand cleaners, both methods

are helpful in preventing the contamination of central line sites and the attendant bloodstream infections.[12] Appropriate hand hygiene should be done before and after examining a catheter insertion site but not after an antiseptic application unless the antiseptic technique is maintained. Washing hands before and after insertion, accessing, fixing or dressing a catheter is also of utmost importance.[5] In addition, hands should be washed before donning gloves and after removing them, when the hands are obviously soiled as well as before and after invasive procedures and as soon as possible if suspicion of contamination is there.

Chlorhexidine skin antisepsis has been shown to provide better skin asepsis as compared to all other techniques including use of povidone iodine. Chlorhexidine has been shown to be effective antiseptic in neonates. One-time skin cleansing with 0.25% chlorhexidine reduced colonization by 62% compared to no cleansing.[13] A study comparing the effectiveness of chlorhexidine to povidone iodine and sodium hypochlorite found all antiseptics were comparable for short procedures but found chlorhexidine to be the only antiseptic with substantive effect, indicating that the antiseptic is effective against the introduction of new organisms over time. Chlorhexidine is recommended for longer procedures such as indwelling catheter insertion and surgery. The technique applied starts with preparing the skin with antiseptic 2% chlorhexidine with 70% isopropyl alcohol.[14,15] After that, the operator uses it to saturate the pad and then apply it on the site of insertion in a circular motion from inwards to outwards for at least 30 seconds. After doing this, the clinician should give the aseptic solution at least 2 seconds to completely dry before puncturing the site of insertion.

Maximal sterile barrier precautions is the key approach to reduce the likelihood of ULABSI while preparing for insertion of umbilical line. The clinician inserting the line as well as those assisting in the procedure must strictly follow the maximal sterile barrier precautions, which includes wearing a cap, mask, gown and gloves.[16]

Daily reviewing will ensure that there is no unnecessary delays in removal of unnecessary lines that are not needed for the care of the patient or to do no harm to patient. Generally, these lines are retained in the place as these give the clinical team a reliable access to administer IV medications and or sometimes the personnel responsible has not considered about removal of lines. Increasing duration of in situ lines increases the infection risks associated with them. Changing the lines routinely is not necessary if there are no signs of local and systemic inflammations and the line is working properly.[5]

In neonatal intensive care unit, umbilical lines are usually inserted to administer total parenteral nutrition, inotropes or to give medications intravenously. The umbilical venous catheter (UVC) is one of the most commonly used central venous access device in the neonatal period. The correct location of the tip of umbilical venous catheter is at the junction between the inferior vena cava (IVC) and the right atrium (RA), which can be reached after entering the umbilical vein and passing through the ductus venosus (DV). This position is considered to be associated with lowest incidence of complications.[17-21] Clinicians have been using the UVCs for more than 60 years, the standard of care in the management of such a device is still a matter of debate. The purpose of this study is to assess the adherence of various intervention methods to reduce ULABSI in neonatal intensive care units. Prior studies have shown the effectiveness of bundled educational and behavioral interventions in improving the compliance with recommended catheter care practices and reducing the CLABSI incidence.[22-27] However the bundle has shown an inconsistent result in NICU, hence this will be addressed in this study. The evidence of care bundle in preventing infections is known, despite of this, implementation of care bundle is a challenge and hence quality improvement (QI) principles are needed to bridge this know-do gap.[28] The aim of this study is to assess the effects of QI Initiative on ULABSI in Neonatal Intensive Care Unit.

AIMS AND OBJECTIVES

1. To study the effect of quality improvement on umbilical line associated blood stream infection
2. To study factors causing umbilical line associated infections.

REVIEW OF LITERATURE

Central Line-Associated Bloodstream Infection

The range of HAIs with CVC includes not only laboratory-confirmed bloodstream infection (BSI), but also the clinical sepsis[29-31] The definitions of laboratory-confirmed BSI is the isolation of recognized pathogens from blood culture that are not related to infection at another site, with clinical characteristics of sepsis.

The definition of catheter colonization is absence of infective signs and significant growth of micro-organisms from the catheter tip, subcutaneous segment of the catheter, or catheter hub. For infection identification or colonization, distal portion of catheter is rolled 4 times over the surface of a sheep-blood agar plate and the number of micro-organisms (>15 colony-forming units) is checked after 48 hours of incubation. Like this, semiquantitative culture technique only identifies microorganisms from the external surface of the catheter, while quantitative cultures allow the identification of micro-organisms from both the internal and the external surfaces of the catheters.

CRBSI is defined as a laboratory-confirmed blood stream infection with either the positive catheter tip culture or a positive blood culture withdrawn from the CVC. However, Umbilical line-associated bloodstream infection (ULABSI) is that bacteremia which occurs with a central line in place or within 48 hours of a central line removal with clinical symptoms of sepsis and no other apparent source of infection, with or without positive culture through the catheter.

The definition of clinical sepsis requires the following conditions: clinical symptoms or signs of sepsis, blood culture not sent for investigation or no organism or no antigen detected in blood, and no apparent infection at another site.

Pathophysiology

Pathogenesis of CRBSI requires more of the bacterial adherence and less host defence mechanisms. CVCs are much prone to bacterial infections, particularly S. aureus and CoNS. It is known that fibrinogen

and fibronectin are the dominant plasma mediators in staphylococcal adherence and get deposited on inserted catheters.[32] Also, staphylococci are colonized to CVC surface by formation of a multilayered biofilm (slime), resulting in some protection against antibiotics.[33]

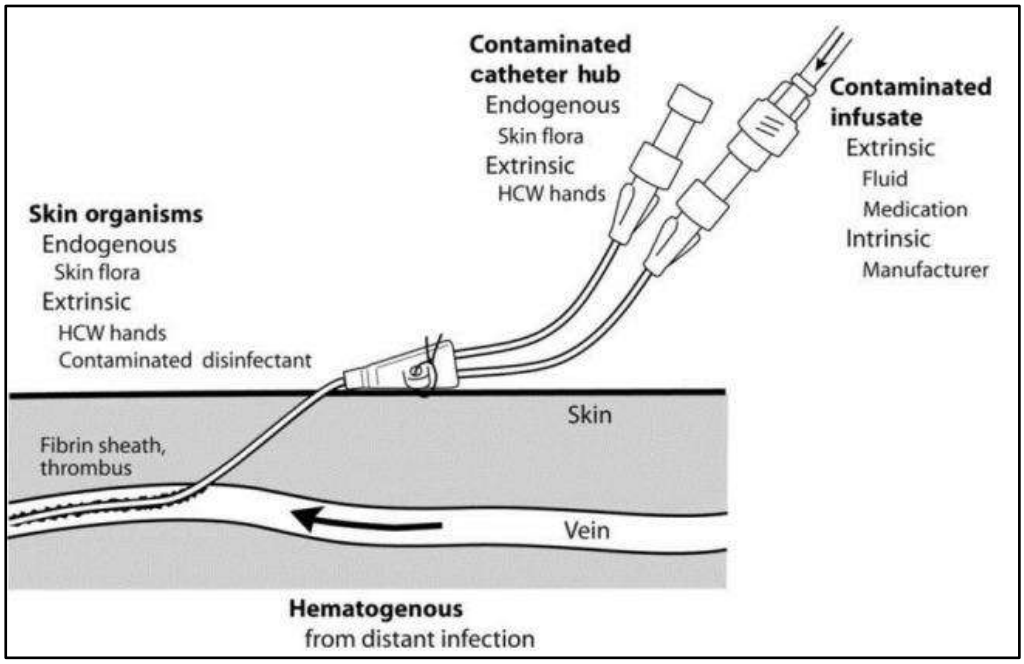
Healthcare associated infections (HAIs) with CVC occur by four distinct pathways in infection process, including pathways of colonization of external and internal catheter surface, intrinsic contamination, and hematogenous spread. External surface pathway infection can start with the colonization of the skin insertion site by micro-organisms of the skin flora that move by capillary action through the transcutaneous part of the dermal tunnel surrounding the catheter. Internal surface pathway infection occurs due to colonization of the hub and intraluminal surface of the catheter.[34] Contamination of the fluids or drugs administered intravenously (so-called "intrinsic contamination") constitutes another process responsible for CRBSIs, sometimes it results in outbreaks. Micro-organisms which are not common such as Enterobacter spp, Serratia marcescens, Malasezia furfur, or Candida parapsilosis are identified in some circumstances.[35] Finally, hematogenous spread of infection of the catheter during BSI of any origin represents a third pathway of CRBSIs.[36]

Pathogenesis of CLABSI

There are several high risk pathways and sources causing ULABSI (Pic).[37] First, the catheter insertion site can serve as a site of entry for organisms. In this case, skin flora of the patient which is endogenous and micro-organisms from the hands of healthcare workers or even from contaminated disinfectants are the high risk sources. Second, during the use of catheter hub operation it can be contaminated by organisms from the patient's skin flora or healthcare workers' hands. Third, IV fluids or drugs can be contaminated during the process of preparation or the manufacturing process of the company. Finally, there may be a secondary infection that leads to catheter infection due

to hematogenous dissemination of infection in other parts of the body.[37]

Picture 1: Potential pathways and sources leading to central line-associated bloodstream infections. HCW, health care worker. Reprinted from Crnich et al. Clin Infect Dis 2002;34:1232-42, with permission of Oxford University Press.[37]



One of the major steps in the process of catheter related blood stream infection is the formation of biofilms extraluminally and intraluminally. Biofilm is composed of bacterias embedded within extracellular polysaccharide matrix on catheter surface.[38] These biofilms develop within 24 hours of the catheter insertion by skin micro-organisms and are mainly formed on the external surface of catheter. Over time, a biofilm is formed on inner surface of the catheter, which occurs mainly while connecting and disconnecting the catheter hub. This usually occurs in long-term catheters that remain in situ for >10 days. Bacteria embedded in biofilms are less susceptible to the effects of antibiotics due to their low metabolic rate. The minimum inhibitory concentrations for microorganisms in a biofilm are known to be up to 1,000fold higher than planktonic organisms.[39] In addition, biofilms are highly impenetrable to antibiotics. Therefore, it is difficult to eradicate the infection without the removal of the infected device.

Risk factors

Major risk factor for development of these infections (ULABSIs/ CRBSIs) includes the indwelling time of catheters. Zingg et al., 2011[31] presented that the median time to infection to PICCs and umbilical catheters was 7 (interquartile range, 5 to 10) and 7 (interquartile range, 5 to 8) days, respectively. Hoang et al., 2008[40] concluded a median time of 9 days for infections to PICCs of the upper extremities, although the median time was longer (15 days) for PICCs of the lower extremities. The National Institute of Child Health and Human Development Neonatal Research Network showed that the risk of late-onset sepsis increases as the duration of CVC and parenteral nutrition increases, and neonates who developed sepsis had higher mean indwelling times than neonates without sepsis. The risk of late-onset sepsis (LOS) increased significantly for catheters in place for 22 or more days.[41]

Some authors reported that low birth weight is the most important risk factor for the occurrence of CLABSI/CRBSI. de Brito et al., 2010[42] showed that neonates whose weight was less than 750 g revealed the highest CRBSI incidence rate (3.3/1,000 days CVC). In the National Healthcare Safety Network survey[43], the rate of CRBSIs was 4.4 to 6.4 per 1,000 catheter days among the neonates whose weight was less than 1,000 g.

Anticoagulants are used to prevent catheter thrombosis. Because thrombi and fibrin deposits on catheters may serve as a focus for microbial colonization of CVC, the anticoagulants use may have a role in the prevention of CRBSI. It is known that surface heparinization shows a great effect on bacterial colonization and can be a significant approach to the prevention of catheter-associated bacteremia or fungemia.[44]

Venous access can be difficult in very low birth weight infants, and a femoral vein can be the alternative site available for cannulation after failure to insert CVCs in all other peripheral veins. Although the Hospital Infection Control Practices Advisory Committee, Center for Disease Control and Prevention in United States recommends that

femoral catheters to be avoided when possible, because they are associated with a higher risk for deep vein thrombosis (DVT) and more likely to become infected[45], there were reports that there was no variability among sites of catheter placement.[40,46]

Microbiology

Most microorganisms in Catheter related blood stream infections are gram-positive cocci, which are responsible for at least two-thirds of infections[47] De Brito et al. 2010 reported that coagulase-negative Staphylococci (CoNS) was the most common microorganism leading to laboratory-confirmed Blood stream infections (39.7%) and CLABSI/CRBSI (42.9% and 60.0%, respectively), and Staphylococcus aureus was the second leading cause of BSI. Gram-negative bacilli (Klebsiella spp.,Acinetobacter baumannii, Escherichia coli, Pseudomonas aeruginosa, Enterobacter spp.) are responsible for a much higher proportion of CRBSIs in ICU patients than inpatients who are not in ICU. These infections are due to colonization of invasive pressure monitoring systems, complicated remote infections, or high levels of orotracheal colonization[48] Candida spp. are important pathogens in CRBSIs and are responsible for a high proportion of the dramatic increase in the rate of candidemia over recent decades. They were reported as >30% of pathogens from 1992 to 1998 in 204 mixed ICUs participating in the U.S. National Nosocomial Infection Surveillance System[49], confirming that intravascular devices are the leading cause of nosocomial candidemias. However, the incidence of each microorganism isolated from catheters differed among different NICUs.[47]

Management

Septicemic infants have lesser infection-related complications when the CVC is removed promptly.[50] A single blood culture positive for Staphylococcus aureus or a gram-negative rod warrants central line removal in a neonate. For neonates with 1 positive culture for CoNS, clinicians may attempt medical management without central catheter

removal, but documentation of subsequent negative blood cultures is crucial. Once a neonate has had 3 positive blood cultures for CoNS, the central catheter should be promptly removed.

There is evidence that fluconazole give antifungal prophylaxis for infants <1,000 g and/or <27 weeks' gestation[51] To have the greatest effect and target the highest risk period, antifungal prophylaxis should be started within the first 2 days of life and continue until central or peripheral IV access is no longer needed. If Candidemia occurs, it warrants prompt central line removal.

Prevention

Strategies for reducing CRBSI include: 1) precaution during line insertion; 2) managing CVC and CVC-connection; 3) reduction of duration of time that the CVC is used; 4) Vancomycin prophylaxis for CVCs; 5) removal of CVC when there is a positive culture.

Good hand hygiene combined with appropriate technique during catheter insertion results in protection against CRBSI. Maximal universal precautions (e.g., caps, masks, sterile gowns and sterile gloves) during catheter confers reduction of CRBSI incidence, compared with standard precautions. Taylor et al., 2011[52] reported that CRBSI in very low birth weight infants who required long term central venous access was reduced by nearly half after the institution of a dedicated PICC team in the NICU.

Schulman et al., 2011[53] reported that state-wide application of standardized, evidence-based central-line insertion and maintenance bundles substantially reduced NICU CLABSIs. Bundles are defined as a limited number of specific practices essential for effective and safe patient care that, when implemented together, results in the additional improvement in patient outcomes. Insertion bundle includes the following:- establishing a CVC insertion kit, hand hygiene with appropriate antiseptic agents before the procedure, maximal universal precautions, and patient disinfection with appropriate antiseptics (e.g., 2% chlorhexidine, 70% alcohol). Proper maintenance bundles of the CVC should include hand hygiene with antiseptics before dressing

catheter site, the establishing the sterile field, limiting frequency of blood collection through the catheter, rubbing the hub with disinfectants (e.g., 2% chlorhexidine, 70% alcohol) at the time of hub entry or disconnection, daily change of administration sets (e.g., intravenous tubing set),[54] avoiding the use of multilumen catheters, integrity of the dressing, evaluating catheter site for signs of infection, and re-evaluating catheter necessity and prompt removal of catheter that is no longer needed.

A 10% povidone-iodine solution is usually used as disinfectant for whole-skin surfaces of all nursery patients. However, it can damage the thyroid function, especially in premature infants. The use of CHG for the insertion and maintenance of CVCs is recommended for adult and paediatrics populations over povidone iodine, although its use is still controversial in neonates. The U.S. Federal Drug Administration has not approved CHG for cutaneous use in infants less than 2 months of age. Nevertheless, off-label use of CHG in NICUs is common: more than 60% of U.S. neonatology staff reported using CHG in their NICUs.[55] The concentration of CHG used for neonates is lower than that used for adults (0.5% vs. 2.0%), although its effectiveness is possibly reduced.[56] Garland et al., (2009)[57] reported severe contact dermatitis with the use of a CHG impregnated patch that was placed over catheter sites after insertion.

Most episodes occurred in neonates who were <1 week old and <28 weeks' gestation at birth. Garland et al., 2005[58] suggested that occlusion, pressure created by the dressing, CHG, or a combination of all 3 factors were responsible for severe contact dermatitis of the dressing site.

In a randomized clinical trial, prophylactic use of a heparinized saline containing vancomycin 25 ug/mL (antibiotic lock technique) markedly reduced the incidence of CRBSI in VLBW infants with PICCs and did not promote no vancomycin-resistant enterococci or CoNS.[58] However, several issues still need to be resolved before the routine use of antibiotic lock to prevent CRBSI. They include ideal dwell times and drug concentrations, progressive reduction of antibiotic activity,

compatibility between antibiotics and heparin, antimicrobial resistance and risk of systemic toxicity, and universal application of antibiotic lock technique awaits validation by larger clinical trials.[59]

Review of Related Literature

García et al., (2022)[60] Explained that this scoping review aimed to synthesize published literature on infection prevention and care bundles addressing neonatal HCAI in low middle-income countries and to establish a Classification Framework for their components (elements).Five electronic databases were searched from January 2001 to July 2020. A mixed-methods approach was applied: qualitative content analysis was used to make a classification framework to categorize bundle elements and the contents of the classification groups were then described quantitatively. 3619 records were analyzed, with 44 eligible studies identified. The bundle element Classification Framework was created which involved: (1) *Primary prevention,* (2) *Detection*, (3) *Case management*, and *Implementation* (3 + I*)*. The 44 studies included 56 care bundles with 295 elements that were then classified. *Primary prevention* elements (128, 43%) predominated of which 71 (55%) mainly aimed at central line catheters and mechanical ventilators. Only 12 elements (4%) focused on detection. A further 75(25%) elements addressed *case management* and 66 (88%) of these focused on outbreak control.

Jeong et al., (2021)[61] The aim of this study was to estimate the effect of targeting risk factors for the control of CLABSI among high-risk infants in a tertiary neonatal intensive care unit (NICU). Infants admitted to the NICU and diagnosed with CLABSI between January and December 2013 were eligible for inclusion to the study. The CLABSI group (n=47) was matched in a 1:2 ratio to the control group (n=94) based on gestational age, birth weight, and Score for Neonatal Acute Physiology-II. Risk factors for CLABSI were identified based on Cox proportional hazard model, and analysis of the effect of these risk factors leading to infection control was performed. The risk factors

associated with CLABSI were :- prolonged central line dwell days (adjusted hazard ratio [HR], 1.028 with 95% confidence interval [CI], 1.011 to 1.045; *P*=0.001), use of silicone catheter (adjusted HR, 5.895; 95% CI, 1.893 to 18.355; *P*=0.002), surgical treatment (adjusted HR, 3.793; 95% CI, 1.467 to 9.805; *P*=0.006), and less probiotic supplementation (adjusted HR, 0.254; 95% CI, 0.068 to 0.949; *P*=0.042). By targeting these risk factors with the quality improvement initiative, the mean CLABSI incidence rate per 1,000 catheter-days showed reduction from 6.6 to 3.1 (*P*=0.004). Targeting these risk factors for infection control significantly led to reduction in the rate of CLABSI among high-risk infants in the NICU.

Paplawski et al, (2020)[62] Conducted a study on Central line-associated bloodstream infections which are a significant patient safety issue for neonates in the neonatal intensive care unit. To prevent these devastating and costly infections is a global priority for health organisations and a key to minimise harm for this vulnerable population of . The aim of this study is to explore and to identify the evidence-based prevention strategies for central line-associated blood stream infections in neonates. Thematic analysis of literature revealed for effective preventive strategies: central line care bundle, consistent education, regular surveillance and dedicated vascular access teams. Evidence suggests that a combination of these interventions is the most effective strategy; however, future research is required to find out the preferred skin antiseptic and to continue exploring new prevention strategies.

Bannatyne et al., (2018)[63] In this report, rates of CLABSI and central line utilisation rate were examined followed by which central line bundle was introduced in our Neonatal Intensive Care Unit (NICU) at the Canberra Hospital.The study was a retrospective cohort study in which neonates admitted to the Canberra Hospital NICU between January 2011 and December 2016 and had a central line in situ were included in the study. Following data like central line days, bed days, infection

rates, and patient demographics were collected before introducing the intervention bundle and after introducing the intervention bundle. CLABSI rates were calculated per 1,000 central line days for before 2011-2013 and after 2014-2016 the introduction of bundle. The post intervention period was retrospectively analysed for compliance, with data like the completion of maintenance forms and insertion forms collected. The results showed a reduction in CLABSI rates to 4.9 per 1,000 central line days in the intervention period from 8.8 per 1,000 central line days with a p value of <0.001. Central line utilisation ratio (CLUR: ratio of central line days to bed days) was also reduced between pre- and post intervention periods, from 0.177 (4414/25013) to 0.13 (3633/27384; p<0.001). Compliance to insertion forms and maintenance forms was observed to increase within the intervention period. The implementation of the central line bundle was effective in decreasing both CLABSI rates and dwell time (CLUR) for central venous catheters.

Balla et al., (2018)[28] this QI study was conducted to study the impact of a quality improvement (QI) initiative using care bundle approach on CLABSI rates. A QI team for infection control in NICU was made in tertiary-care neonatal intensive care unit (NICU) from June 2015 to August 2016. Baseline data was collected in first 3 months followed by the intervention period of 1 year. Measures taken to strengthen hand hygiene and central line bundle care was implemented during the intervention period. Audits were done to assess the compliance with hand hygiene and CLABSI bundle protocols were used as process indicators. Multiple PDSA cycles were used to strengthen the practices of proposed interventions, documenting data and audits of the processes during the study period. The QI initiative led to a 89% reduction of CLABSI from the baseline rate of 31.7 to 3.5 per 1000 line-days. The blood stream Infections decreased from 7.3 to 2.3 per 1000 patient-days. The overall mortality showed a improvement from 2.9% to 1.7 % during the intervention period. There was a significant improvement in compliance of hand hygiene protocol and compliance

with CLABSI protocols. This study demonstrated that simple measures including hand hygiene and strengthening the care bundle approach through quality improvement could significantly lead to the reduction of the blood stream Infections and CLABSI rates.

Schmid et al., (2018)[64] This systematic survey included total of 27 studies published between 2002 and 2016 for the prevention of central-line associated bloodstream infections (CLABSI) on the benefit of preventive bundles in neonatal intensive care. Most of the studies were cohort studies or studies analyzing an interrupted time series before and after intervention. The studies showed variability in terms of endpoint definitions (CLABSI), details of the implemented measures, and evidence of a publication bias in favour of the use of preventive bundles. The collaborative analysis showed statistically and clinically significant benefit of preventive bundles to prevent CLABSI in neonatal intensive care.

Mobley & Bizzarro (2017)[65] Explained that CLABSIs are one of the most common healthcare-acquired infections in the neonatal intensive care unit population and are associated with increased risk of morbidity and mortality, as well as increase in healthcare costs, and duration of hospitalization. Over the past 10 years, numerous local, state-wide, and national quality improvement initiatives have led to significant reduction in CLABSI rates. The majority of successful initiatives have utilized similar strategies to implement and sustain their efforts, including education of NICU staff, the principles of quality improvement, creation and implementation of central line insertion and maintenance bundles and methods for assessing compliance, forming dedicated central line insertion and maintenance teams, and utilizing reliable and effective methods for collecting, analysing and displaying data. Despite of this progress, continuing work toward discovery of better practices, such as the safest and most effective agent for cutaneous antisepsis or identification of optimal outcome and process measures, is required if further progress is to be needed. Additionally,

sustained progress in decreasing the burden of neonatal infections may require a shift in focus away from CLABSI but towards the reporting, investigation, and prevention of all NICU-onset septicaemia.

Neill et al., (2016)[66] Explained that reduction of BSI has emerged as an important patient safety goal. Implementing central line insertion bundles, standardizing line care protocols, and health care provider education programs have reduced BSI in NICUs around the country. The ability of tertiary care centers to reduce nosocomial infections, including BSI, has been demonstrated. However, long-term BSI reductions in infants are not well documented. We sought to demonstrate that a low incidence of BSI can be sustained over time in a tertiary care NICU.6,790 infants were admitted to a large, tertiary care NICU from 2005 to 2013. Retrospective intervention study was done. A staged, multifaceted infection prevention plan was implemented started from October 2007 under nursing leadership. The incidence of BSI was noted annually for 2005-2013.Baseline BSI incidence for infants admitted to NICU was 5.15 and 6.08 episodes per 1,000 infant-days in 2005 and 2006, respectively. After protocol implementation, the incidence of BSI reduced to 2.14/1,000 infant-days and 2.44/1,000 infant-days in 2008 and 2009, respectively. Yearly incidence remained low over the next 4 years and decreased even further to 0.20-0.45 infections/1,000 infant days. This represents a 92% reduction in BSI over a period of more than 5 years. Implementation of a nursing-led comprehensive infection control initiative can effectively lead to and maintain reduction in the incidence of BSI in infants at a large tertiary care NICU.

Shepherd et al., (2015)[67] Conducted a study to describe a quality improvement (QI) initiative that was associated with reduction in neonatal CLABSI rate in a diverse group of 8 intensive care nurseries (Neonatal Services).A quasi-experimental QI initiative was done using the model for improvement and evidenced-based interventions. The aggregate CLABSI rate for Nationwide Children's Hospital-associated

Neonatal Services reduced from 6.0 CLABSI per 1000 catheter days to 1.43 CLABSI per 1000 catheter days in <2 years and has remained in control at 0.68 per 1000 catheter days for over 5 years. Each of 8 nurseries had a 1 year or more CLABSI-free period, including the NICU with the largest patient volume, acuity, and central line usage. Aggregate Neonatal Services has seen 3 CLABSI-free quarters since 2007. Key success factors included: (1) engaging senior executive leadership; (2) bedside "huddles" among clinical and epidemiology staffs conducted within 72 hours after a positive blood culture; (3) implementing chlorhexidine antisepsis and the usage of chlorhexidine-impregnated catheter site discs; and (4) and establishing a dedicated team for percutaneously inserted central catheter insertion to serve units in which central lines are inserted less frequently. Using the model for improvement and evidenced-based interventions, this QI project has led to reduction in the CLABSI rate by 89%, and over 430 CLABSIs likely have been prevented.

Ting et al., (2013)[68] Conducted a study to apply a quality improvement bundle to reduce the prevalence of neonatal CLABSI. A retrospective experimental study was done to compare CLABSI in babes admitted to the authors ' position III NICU from August 2007 to March 2011. The entire study period was divided into four time ages to estimate secular trends. A comprehensive catheter- related bloodstream infection action was enforced in August 2007. The events included staff education, SOP done, introducing new antiseptic agents, implementing central catheter insertion and maintenance checklists, reinforcing the use of minimal sterile barrier preventives, and modification of the central catheter configuration and maintenance protocols. The median CLABSI rate of 7.9 per 1000 catheter days at the starting point of the study (period 1(August 2007 to June 2008))which slowly dropped over the entire study period(P = 0.034): period 2(July 2008 to May 2009),3.3 per 1000 catheter days; period 3(June 2009 to April 2010),2.6 per 1000 catheter days; and period 4(from May 2010 to March 2011),2.2 per 1000 catheter days. A

multidisciplinary comprehensive catheter- related bloodstream infection action redounded in a significant reduction in the CLABSI rate. Continuing the quality enhancement measures are needed to reduce catheter- related bloodstream infections among low- birth- weight neonates.

Bizzarro et al., (2010)[69] Conducted a study to reduce the rate of late-onset sepsis in a NICU by dwindling the rate of central line- associated bloodstream infection (CLABSI). They conducted a quasi-experimental study of an educational intervention designed to ameliorate the quality of clinical practice in NICU. They included all NICU cases with a central venous catheter (CVC). Data was collected from July 1, 2005, to June 30, 2007, to document already existing CLABSI rates and CVC- related practices. A multidisciplinary quality enhancement commission was established to review these and published data and to produce guidelines for CVC placement and operation. Educational approach was taken to apply these practices. Post intervention CLABSI rates were collected during the period from January 1, 2008, to March 31, 2009, and compared with preintervention data and with standard data from the National Healthcare Safety Network (NHSN). The rate of CLABSI in the NICU dropped from 8.40 to1.28 cases per 1,000 central line- days(acclimated rate ratio, 0.19 (95 confidence interval,0.08-0.45). This rate was lower than the NHSN standard rate for position III NICUs. The overall rate of late- onset sepsis reduced from 5.84 to1.42 cases per 1000 case- days (rate difference,-4.42 cases per,000 case-days (95 confidence interval,-5.55 to-3.30 cases per 1,000 case- days). It's possible to reduce the rate of CLABSI, and thus the rate of late-onset sepsis, by establishing and clinging to substantiation- grounded guidelines. Sustainability depends on continuing data surveillance, knowledge of medical and nursing literature, and timely feedback to the staff. The ways established are applicable to other populations.

MATERIALS AND METHODS

Study site- The study was carried out in the NICU of the Department of Pediatrics, Dayanand Medical College and Hospital, Ludhiana.

Source of Data

A prospective cohort study was conducted in the Departments of Pediatrics and Microbiology, Dayanand Medical College and Hospital, Ludhiana, Punjab, India and in neonates who had umbilical line in situ in Neonatal intensive care unit irrespective of gender, born by vaginal delivery or caeseran section, born inside the hospital or born outside the hospital but admitted under the Pediatrics department in DMCH from month of March , 2021 to February, 2022 were included.

METHOD OF COLLECTION OF DATA

Inclusion Criterion

- Neonate admitted in NICU
- Neonates born in or outside the hospital (inborn/outborn)
- Neonates in whom umbilical line was inserted during NICU stay

Exclusion Criterion

- Neonates with major anomalies for example: - chromosomal anomaly, Arnold chiari syndrome, Pierre robin syndrome.
- Death within 48 hours of admission or within 48 hours of umbilical line insertion.

Duration of Study/ Number of Cases

12 Months

Statistical Analysis

- Prospective cohort study in 30 bedded NICU in tertiary care hospital from March , 2021 to February, 2022

- Data was described in terms of range; mean ± standard deviation (± SD), median, frequencies (number of cases) and relative frequencies (percentages) as appropriate. All statistical calculations will be done using (Statistical Package for the Social Science) SPSS 21version (SPSS Inc., Chicago, IL, USA) statistical program for Microsoft Windows.

Case Definitions:-

This was based on Pediatrics Department of DMCH, Ludhiana, protocols adapted from WHO and CDC guidelines on central line blood stream infections.

Primary BSI	A laboratory-confirmed bloodstream infection that is not secondary to an infection at another body site
Secondary BSI	A BSI that is thought to be seeded from a site-specific infection at another body site
CLABSI rate	The total no of CLABSIs divided by the total no of device days × 1000
Access	The performance of any of the following activities during in-patient admission: • Line placement • Use of (entering the line with a needle or needless device) any central line for: • Infusion • Withdrawal of blood • Haemodynamic monitoring
Umbilical line (UL):	An intravascular catheter that terminates at or close to the heart, or in one of the great vessels used for

infusion, the withdrawal of blood, or haemodynamic monitoring.

- Aorta
- Inferior vena cava

Eligible Umbilical Line:	An Umbilical Line that has been in place for more than two consecutive calendar days (on or after UL day 3), following first access to the umbilical line during the current admission. Such lines are eligible for ULABSI events and remain eligible for ULABSI events until the day after its removal from the body or patient discharge, whichever comes first.
Denominator device days	The count of central lines for an in-patient unit that is recorded in monthly denominator summary data

An umbilical line associated bloodstream infection (ULABSI) is defined as a laboratory-confirmed bloodstream infection not related toan infection at another site that develops within 48 hours of umbilical line placement.

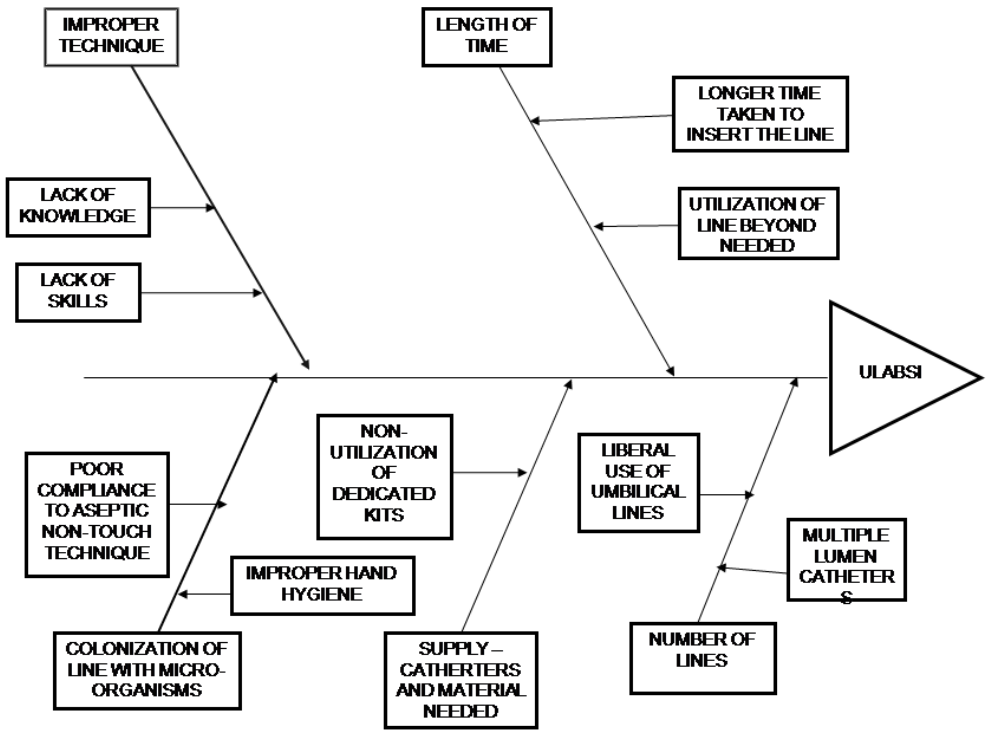
Collection of Data

Based on Pre-defined proforma, patient's demographic details and clinical details were recorded.

A QI Team will be formed involving doctors (from department of neonatology, microbiology), NICU nurses and ICN (Infection Control Nurse) from pediatrics department. Root cause analysis will be done for ULABSI in the unit. Various causes of ULABSI will be identified based on which a QI initiative focusing on Hand Hygiene (HH) and Care Bundle approach (mainly personnel training) to line care will be conducted. A healthcare bundle is defined as a small, straightforward

set of evidence-based practices that, when performed collectively and reliably, have been proven to improve patient outcomes. A laboratory-confirmed bloodstream infection that is not secondary to an infection at another site would be considered as a BSI. Blood cultures that are positive on admission and those reported as contaminants will not be included. The study was conducted in 2 phases in which phase I would be data collection (duration 3 months - 1st march, 2021- 31st may 2021). Phase II was intervention period of 9 months (1st June 2021 to 28th February, 2022).Implementation and sustenance were ensured by Plan-Do-Study-Act cycles.

figure 1: Root Cause Analysis for ULABSI



Strategy

Baseline Period (1st march, 2021- 31st may 2021):- QI team identified the gaps which were leading to aseptic techniques while handling the umbilical line. A group meeting was conducted involving 4 doctors and 8 nurses, ICN to understand the barriers. They found out that there are many gaps which are leading to ULABSI and made a standard operating principle for Umbilical line insertion. After the baseline period

we implemented the aseptic non touch technique in 4 Plan Do Study Act cycles (PDSA cycles). Each PDSA cycle gave clue for change in strategy of next cycle.

PDSA Cycles

PDSA cycle 1 (1st June 2021 to 31st July 2021) QI team spread information to others through teaching sessions, videos, pictures and through WhatsApp messages. A particular person (who has assisted 20 umbilical lines and 10 independent lines) started inserting umbilical lines instead of multiple persons. Staff nurses were sensitised that handling IV lines with aseptic non touch technique reduces healthcare associated infections. All the staff members were sensitized about the importance of hand hygiene and adequate time and steps of hand hygiene were showed and implemented. A umbilical line insertion bundle was made and implemented. Audit was done and data was collected.

PDSA cycle 2 (1st August, 2021 – 31st August 2021) the results of PDSA cycle 1 were displayed showing outcomes and it created further awareness. Group teaching was continued. The time taken to insert the umbilical line was noted and planning was done to reduce the time taken and training was done for the same. The break in sterility by assistant was noted and teaching was done to maintain the asepsis. Training sessions were continued and audits done.

PDSA cycle 3 (1st sept, 2021- 31st October,2021) on the basis of results from PDSA cycle 2, techniques of maintaining asepsis were included in the ongoing teaching sessions. During the baseline study, it was seen that there is breach in sterility during repositioning of the umbilical line if needed. Sessions were conducted to minimize the break in sterility, to measure the length of the umbilical line to be inserted and to confirm it with ultrasound. Daily reviewing of the need of umbilical line was started to minimize the incidence of ULABSI.

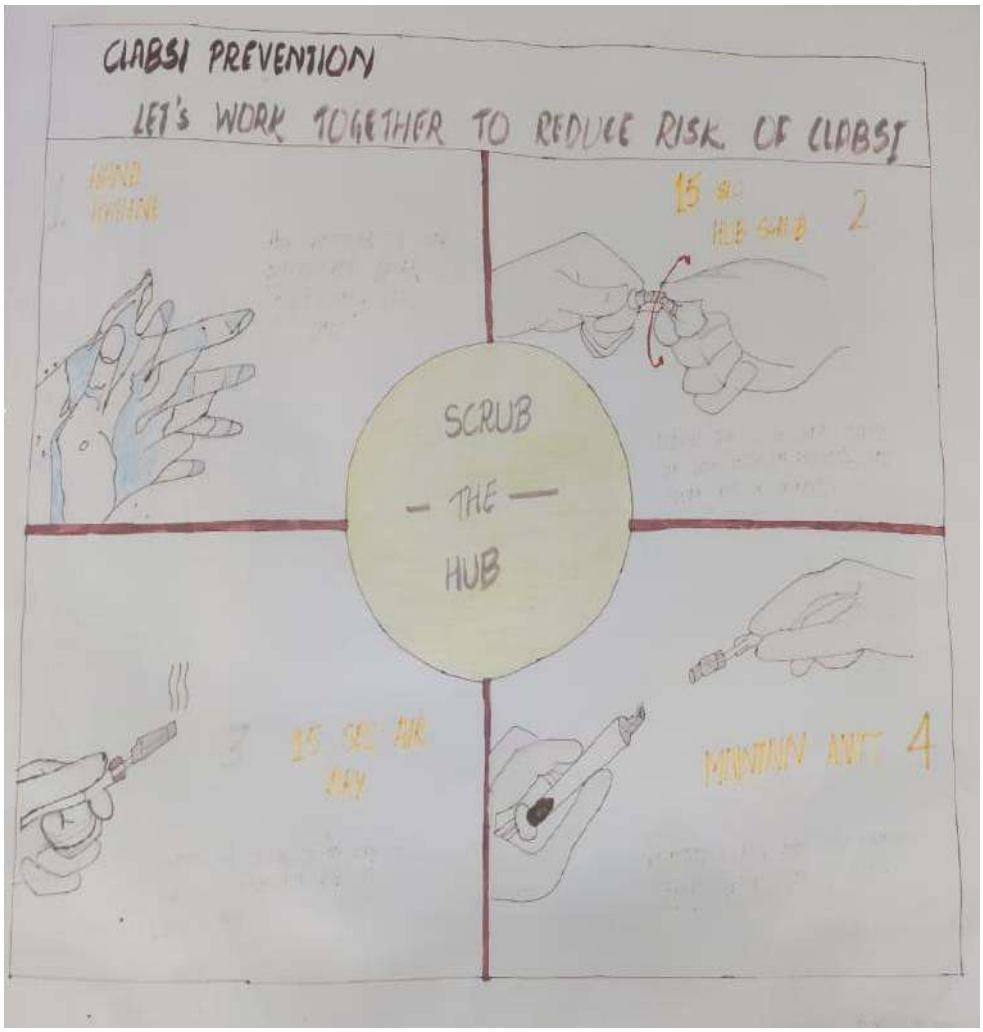
PDSA cycle 4 (1st November 2021 – 28th February, 2022) compliance with aseptic techniques was studied. A reminder to the team after each audit ensured sustained compliance. Displaying of results also helped in enhancing the skills on aseptic non touch techniques.

No of cases:- 101 neonates

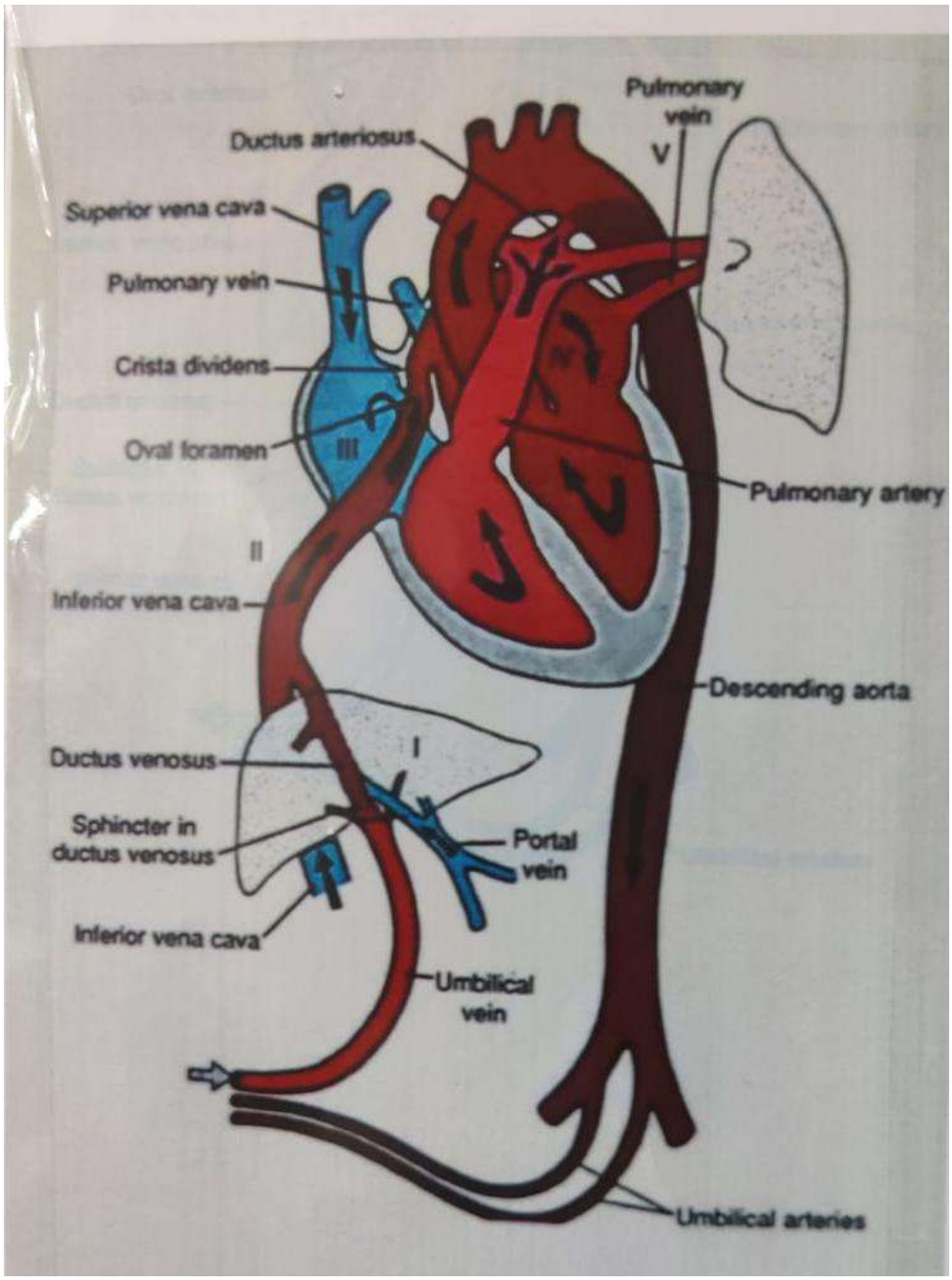
Table 1: PDSA cycles

PDSA Cycle	PDSA 1 (1st June 2021 to 31st July 2021)	PDSA cycle 2 (1st August, 2021 – 31st august 2021)	PDSA cycle 3 (1st sept,2021-31st October,2021)	PDSA cycle 4 (1st November 2021 – 28th February, 2022)
Plan	Improve compliance to bundled care-awareness , hand hygiene	Improve the compliance to hand hygiene, training sessions to new personnel	Sensitisation of new staff to ANTT	Sustaining hand hygiene along with other components
Do	Teaching sessions, display of posters, pictures, videos	Teaching sessions with video demonstration.	Teaching of new staff. Using newer techniques to reduce the need of repositioning of umbilical lines	Displaying results of PDSA cycles
Study	Compliance to hand hygiene and training to insert umbilical line	Aseptic field usage. Qualitative experience revealed forgetfulness and improved by reminder.	Compliance to ANTT improved.	Hand hygiene and other components sustained. Sickness of neonates determined the compliance
Act	Trained person to insert the line, umbilical line insertion bundle and checklist made	Entry of new staff reduced compliance. Continuing implementation of care bundle	Aseptic field use, hand hygiene, reducing break in sterility and time taken to insert a line and daily reviewing the need for umbilical line	Continuing audits and sustain

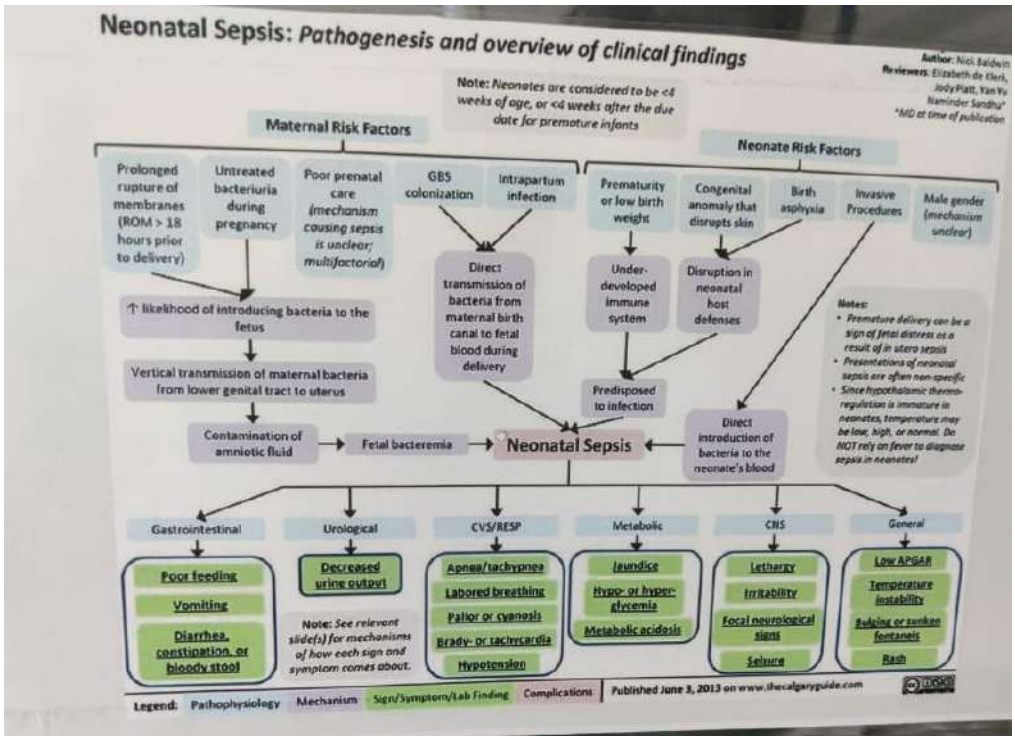
Picture 2: CLABSI prevention



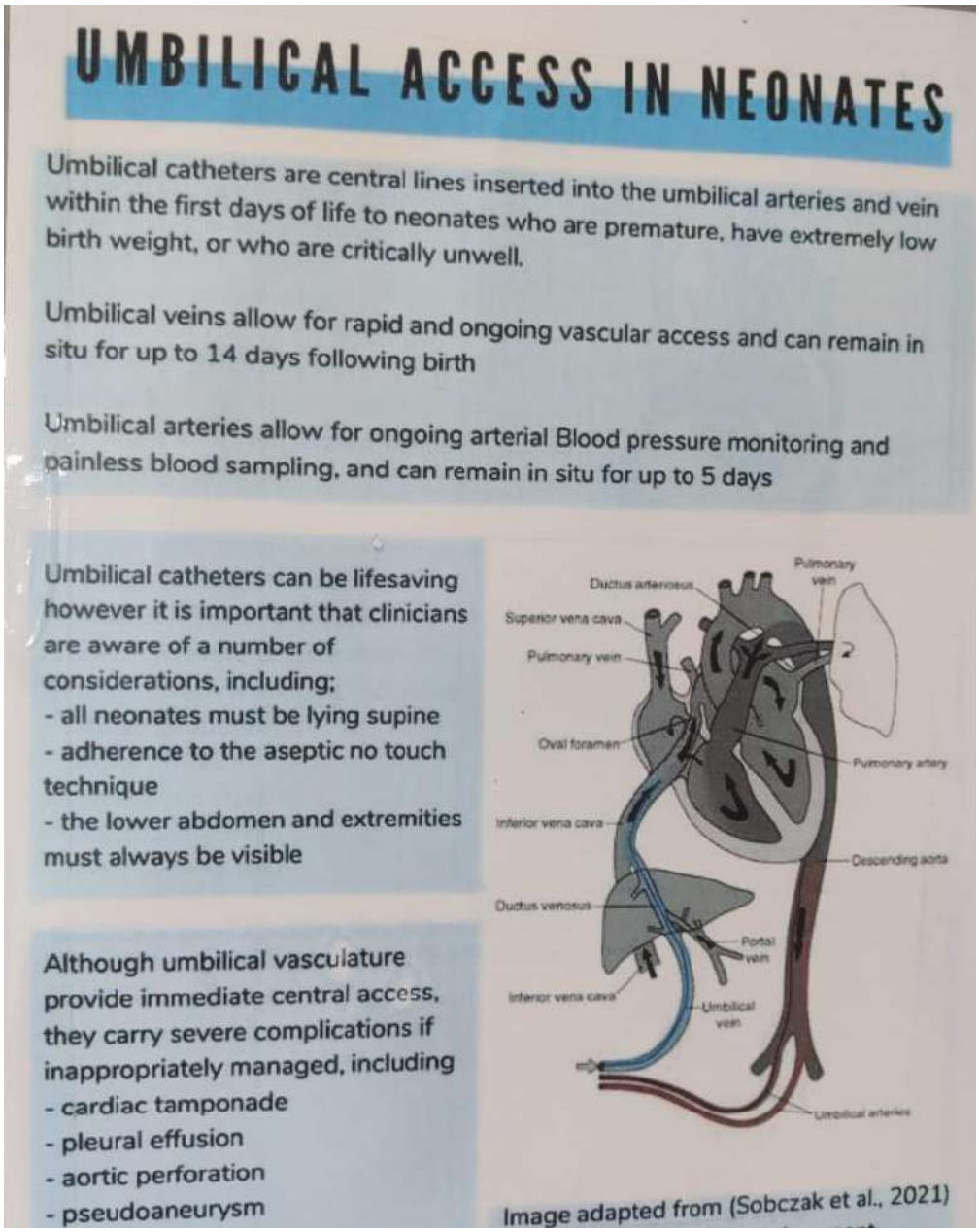
Picture 3: Fetal circulation



Picture 4: Neonatal Sepsis


Neonatal Sepsis: Pathogenesis and overview of clinical findings
Note: Neonates are considered to be <4 weeks of age, or <4 weeks after the due date for premature infants
Maternal Risk Factors
Neonate Risk Factors
Prolonged rupture of membranes (ROM > 18 hours prior to delivery)
Untreated bacteriuria during pregnancy
Poor prenatal care (mechanism causing sepsis is unclear; multifactorial)
GBS colonization
Intrapartum infection
Prematurity or low birth weight
Congenital anomaly that disrupts skin
Birth asphyxia
Invasive Procedures
Male gender (mechanism unclear)
↑ likelihood of introducing bacteria to the fetus
Vertical transmission of maternal bacteria from lower genital tract to uterus
Direct transmission of bacteria from maternal birth canal to fetal blood during delivery
Under-developed immune system
Disruption in neonatal host defenses
Predisposed to infection
Direct introduction of bacteria to the neonate's blood
Contamination of amniotic fluid
Fetal bacteremia
Neonatal Sepsis
Notes:
Premature delivery can be a sign of fetal distress as a result of in utero sepsis
Presentations of neonatal sepsis are often non-specific
Since hypothalamic thermoregulation is immature in neonates, temperature may be low, high, or normal. Do NOT rely on fever to diagnose sepsis in neonates!
Gastrointestinal
Urological
CVS/RESP
Metabolic
CNS
General
Poor feeding
Vomiting
Diarrhea, constipation, or bloody stool
Decreased urine output
Note: See relevant slide(s) for mechanisms of how each sign and symptom comes about.
Apnea/tachypnea
Labored breathing
Pallor or cyanosis
Brady- or tachycardia
Hypotension
Jaundice
Hypo- or hyperglycemia
Metabolic acidosis
Lethargy
Irritability
Focal neurological signs
Seizure
Low APGAR
Temperature instability
Bulging or sunken fontanels
Rash
Legend: Pathophysiology Mechanism Sign/Symptom/Lab Finding Complications
Published June 3, 2013 on www.thecalgaryguide.com

Picture5: Umbilical Access in neonates


UMBILICAL ACCESS IN NEONATES
Umbilical catheters are central lines inserted into the umbilical arteries and vein within the first days of life to neonates who are premature, have extremely low birth weight, or who are critically unwell.
Umbilical veins allow for rapid and ongoing vascular access and can remain in situ for up to 14 days following birth
Umbilical arteries allow for ongoing arterial Blood pressure monitoring and painless blood sampling, and can remain in situ for up to 5 days
Umbilical catheters can be lifesaving however it is important that clinicians are aware of a number of considerations, including;
- all neonates must be lying supine
- adherence to the aseptic no touch technique
- the lower abdomen and extremities must always be visible
Although umbilical vasculature provide immediate central access, they carry severe complications if inappropriately managed, including
- cardiac tamponade
- pleural effusion
- aortic perforation
- pseudoaneurysm
Ductus arteriosus
Pulmonary vein
Superior vena cava
Pulmonary vein
Oval foramen
Pulmonary artery
Inferior vena cava
Descending aorta
Ductus venosus
Portal vein
Inferior vena cava
Umbilical vein
Umbilical arteries
Image adapted from (Sobczak et al., 2021)

Picture 6: Group sessions

Picture 7:- Group session 2

Outcome

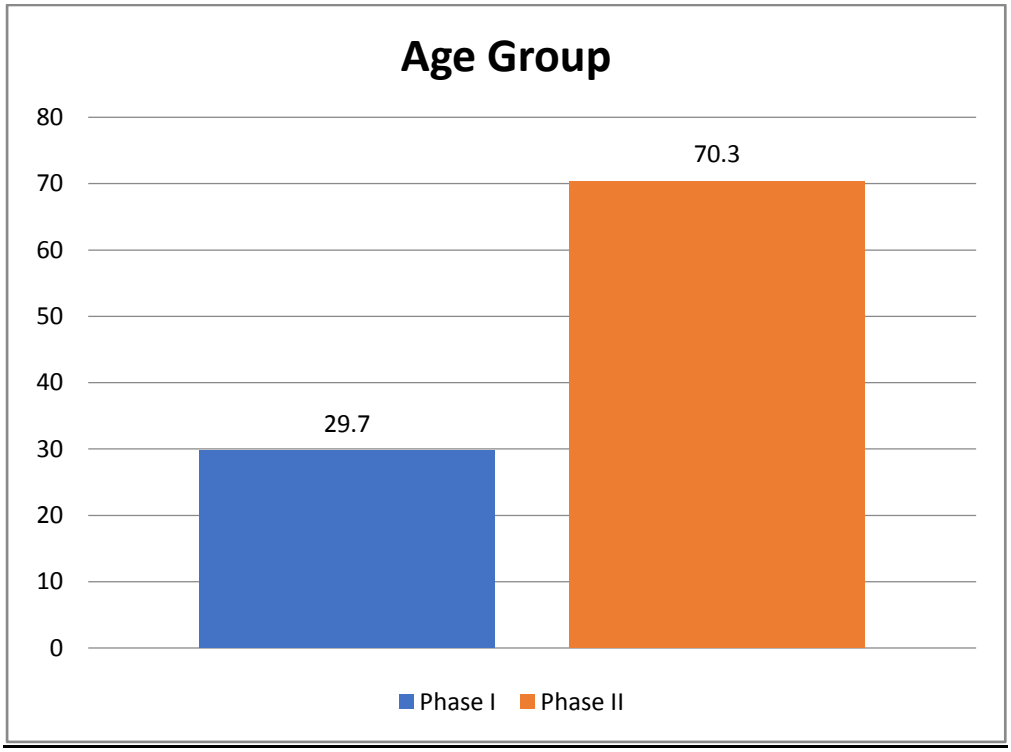
Out of 101 enrolled patients, 30 patients were enrolled as baseline on which no new care bundle steps were done and 71 patients were those on whom care bundle approach was applied and the effect of improvement of umbilical line related infections was studied.

OBSERVATION & RESULT

Table 2: Age Group

Age group		Phase I		Phase II		Total	Chi-square value	p-value
	Days	No. of cases	%age	No. of cases	%age			
	< 1	27	90.0%	65	91.5%	92	0.062	0.803
	> 1	3	10.0%	6	8.5%	9		
Total		30	100.0%	71	100.0%	101		

Figure 2: Age Group

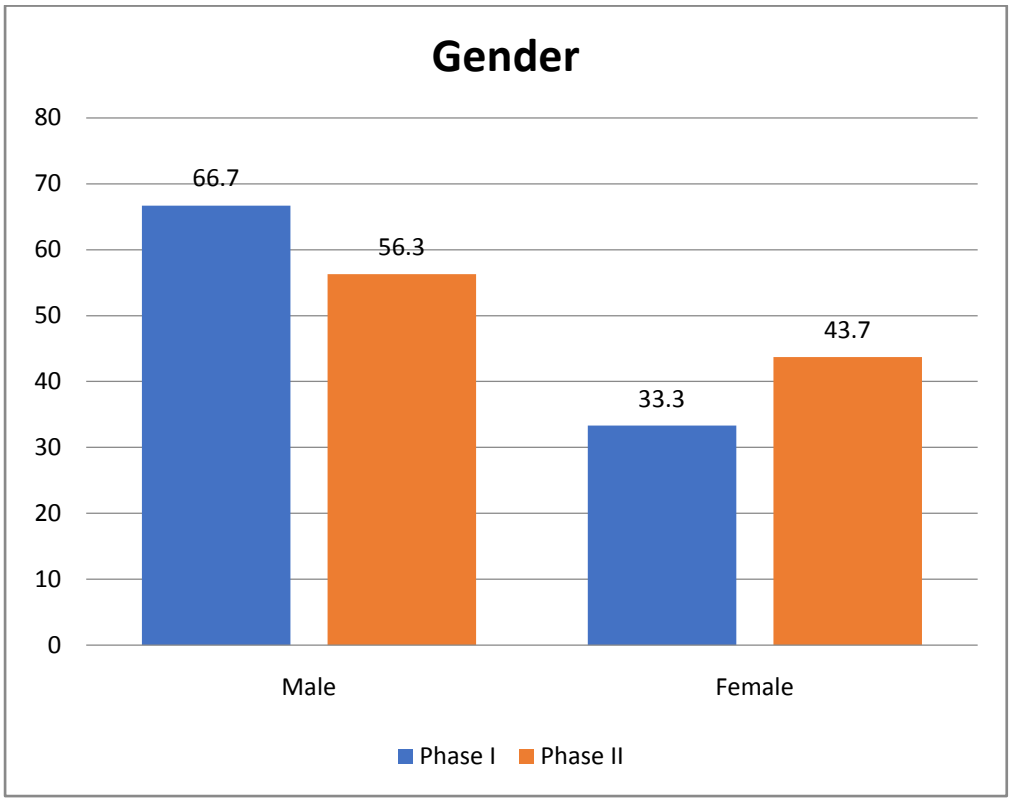


From the above table and graph it was observed that in phase I there were 29.7% subjects while in phase II there were 70.3% subjects. Phase II have significantly higher number of subjects (p=0.00).

TABLE 3: Gender

		Phase I		Phase II		Total	Chi-square value	p-value
		No. of cases	%age	No. of cases	%age			
Gender	FEMALE	10	33.3%	31	43.7%	41	0.933	0.334
	MALE	20	66.7%	40	56.3%	60		
Total		30	100.0%	71	100.0%	101		

Figure 3: Gender

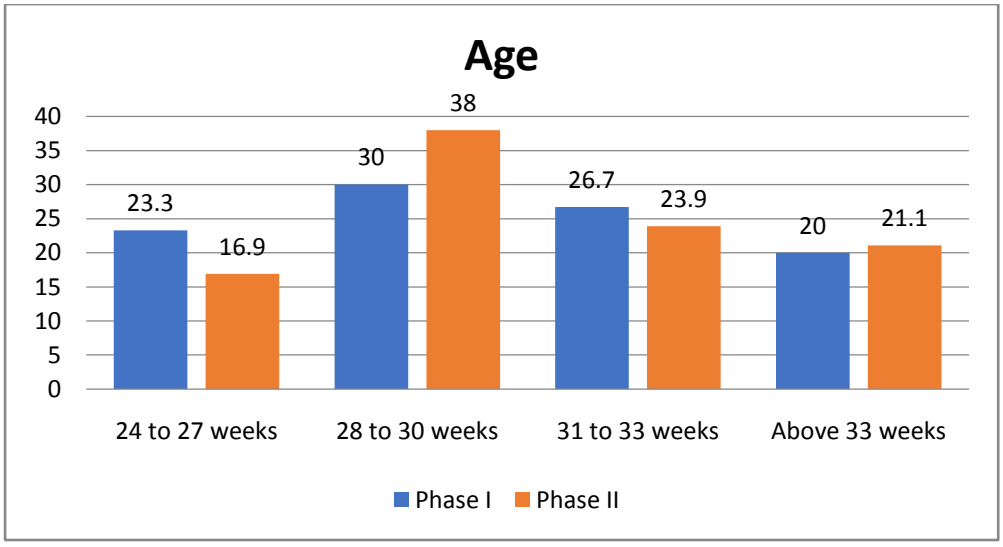


From the above table and graph it was observed that in phase I there was a majority of male subjects in both phase I (66.7%) and 2 (56.3%).

Table 4: Gestational Age

		Phase I		Phase II		Total	Chi-square value	p-value
		No. of cases	%age	No. of cases	%age			
Gest. Age	24	1	3.3%	2	2.8%	3	11.479	0.648
	26	1	3.3%	6	8.5%	7		
	27	5	16.7%	4	5.6%	9		
	28	2	6.7%	12	16.9%	14		
	29	1	3.3%	6	8.5%	7		
	30	6	20.0%	9	12.7%	15		
	31	4	13.3%	9	12.7%	13		
	32	2	6.7%	7	9.9%	9		
	33	2	6.7%	1	1.4%	3		
	34	1	3.3%	2	2.8%	3		
	35	1	3.3%	3	4.2%	4		
	36	2	6.7%	3	4.2%	5		
	37	0	0.0%	4	5.6%	4		
	38	1	3.3%	1	1.4%	2		
	39	1	3.3%	2	2.8%	3		
Total		30	100.0%	71	100.0%	101		

Figure 4: Gestational age

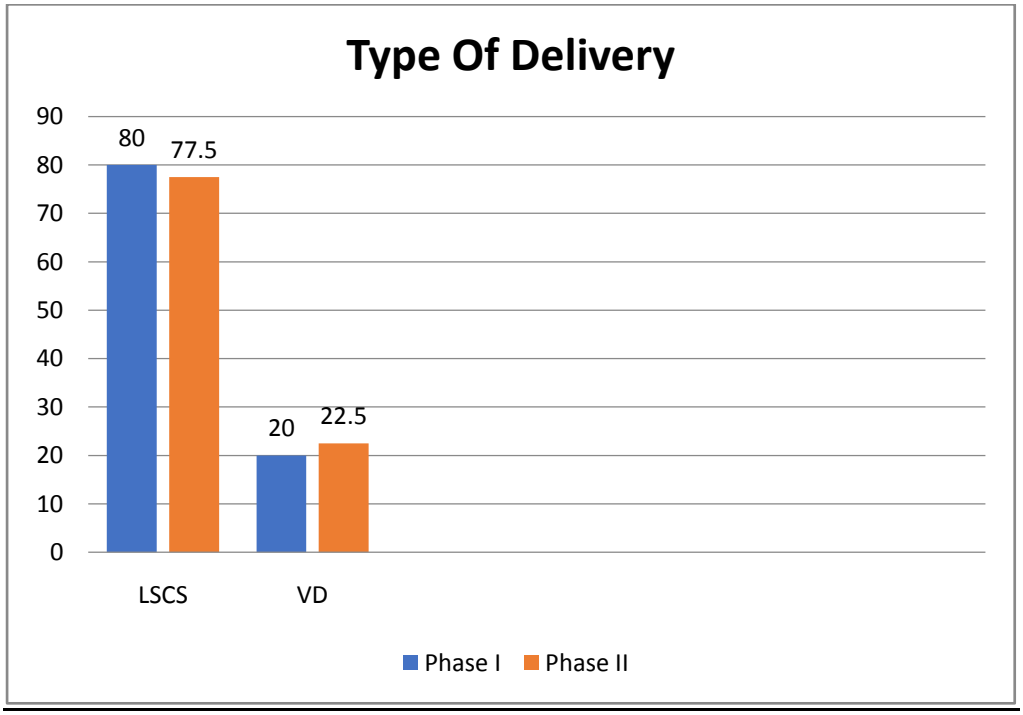


From the above table and graph it was observed that majority of study subjects belongs to age group 28 to 30 weeks.

Table 5: Type of delivery

Type of delivery		Phase I		Phase II		Total	Chi-square value	p-value
		No. of cases	%age	No. of cases	%age			
	LSCS	24	80.0%	55	77.5%	79	0.079	0.778
	VD	6	20.0%	16	22.5%	22		
Total		30	100.0%	71	100.0%	101		

Figure 5: Type of delivery

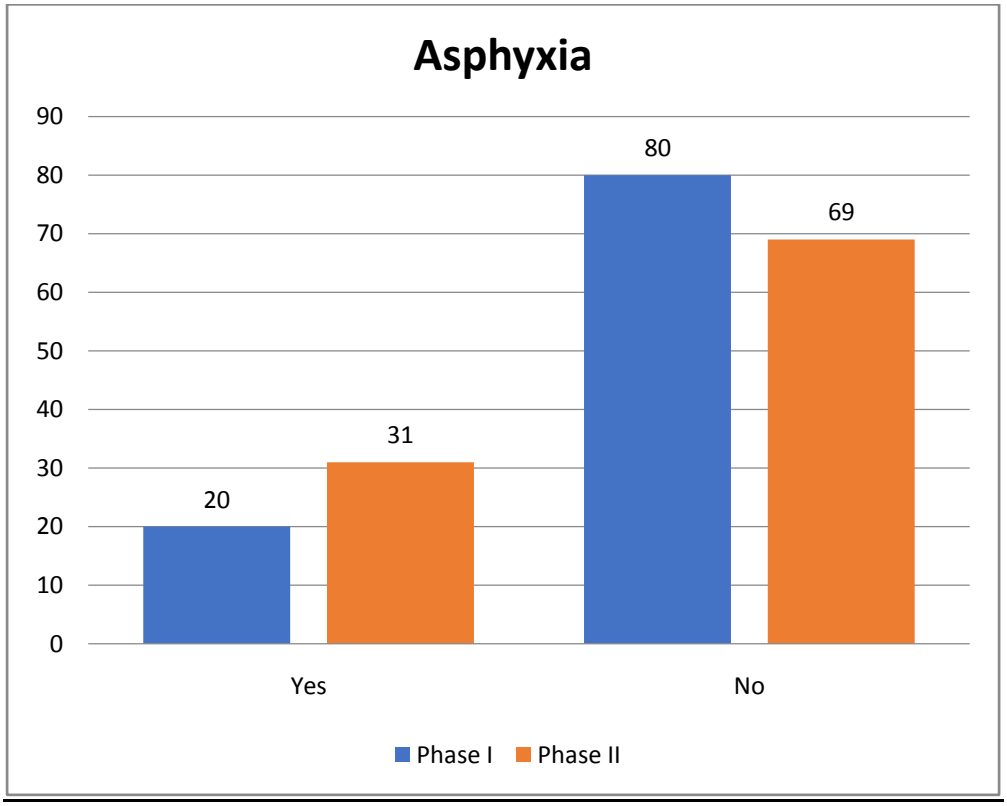


From the above table and graph it was observed that most common type of delivery was LSCS Under Sa (80%) and VD (20%) in phase I while most common type of delivery was LSCS (77.5%), and Vaginal Delivery (22.5%) in phase II.

Table 6: Asphyxia

		Phase I		Phase II		Total	Chi-square value	p-value
Asphyxia		No. of cases	%age	No. of cases	%age			
	NO	24	80.0%	49	69.0%	73	1.27	0.260
	YES	6	20.0%	22	31.0%	28		
Total		30	100.0%	71	100.0%	101		

Figure 6: Asphyxia

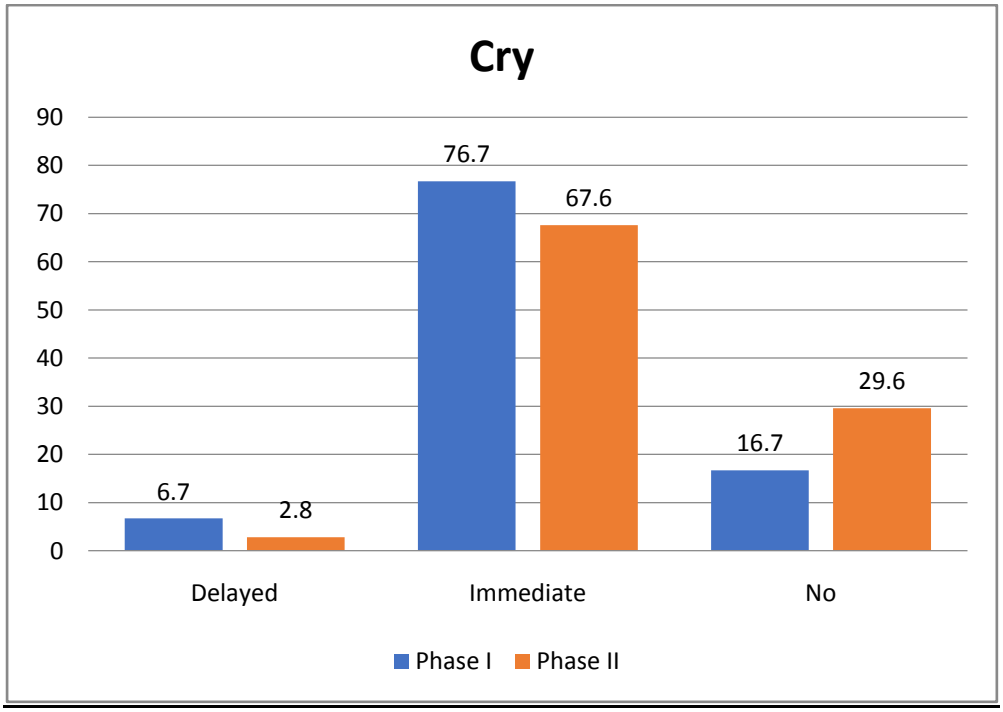


From the above table and graph it was observed that in phase I, Asphyxia was reported in 20% subjects while in phase II, Asphyxia was reported in 31% subjects.

Table 7: Cry

		Phase I		Phase II		Total	Chi-square value	p-value
		No. of cases	%age	No. of cases	%age			
Cry	delayed	2	6.7%	2	2.8%	4	2.585	0.460
	immediate	23	76.7%	48	67.6%	71		
	NO	5	16.7%	21	29.6%	26		
Total		30	100.0%	71	100.0%	101		

Figure 7: Cry

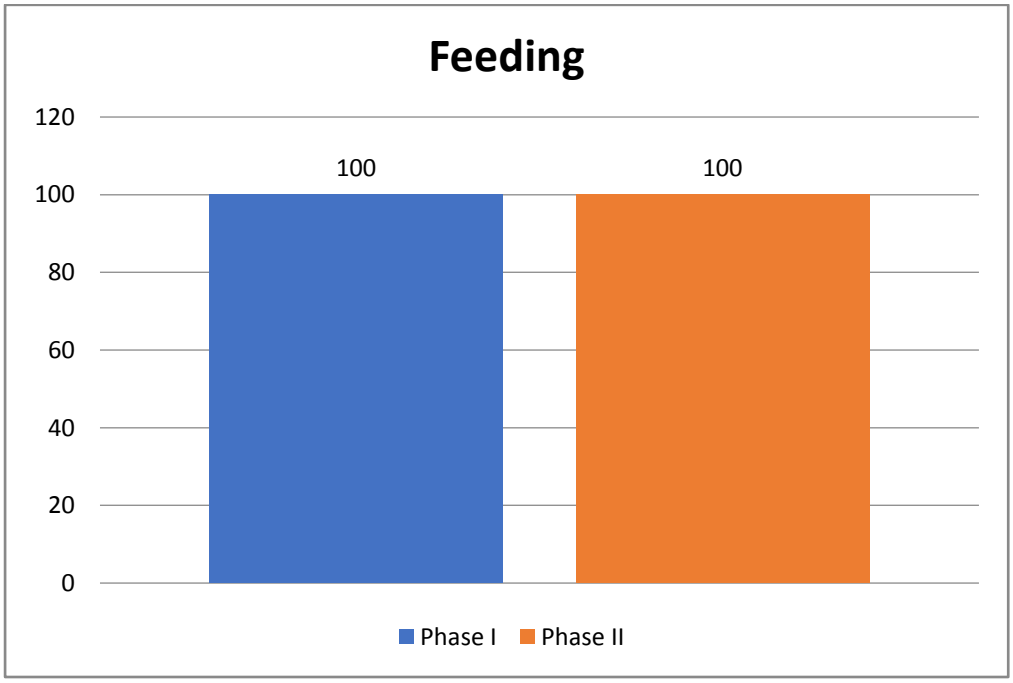


From the above table and graph it was observed that in phase I cry was immediate (76.7%) in majority of subjects. The study found out that in phase II, immediate cry was noted in 67.6% subjects while no cry was reported in 29.6% neonates.

Table 8: Feeding

	Phase I	Phase II	P Value
Expressed Breast Milk	30 (100.0)	71 (100.0)	0.21

Figure 8: Feeding

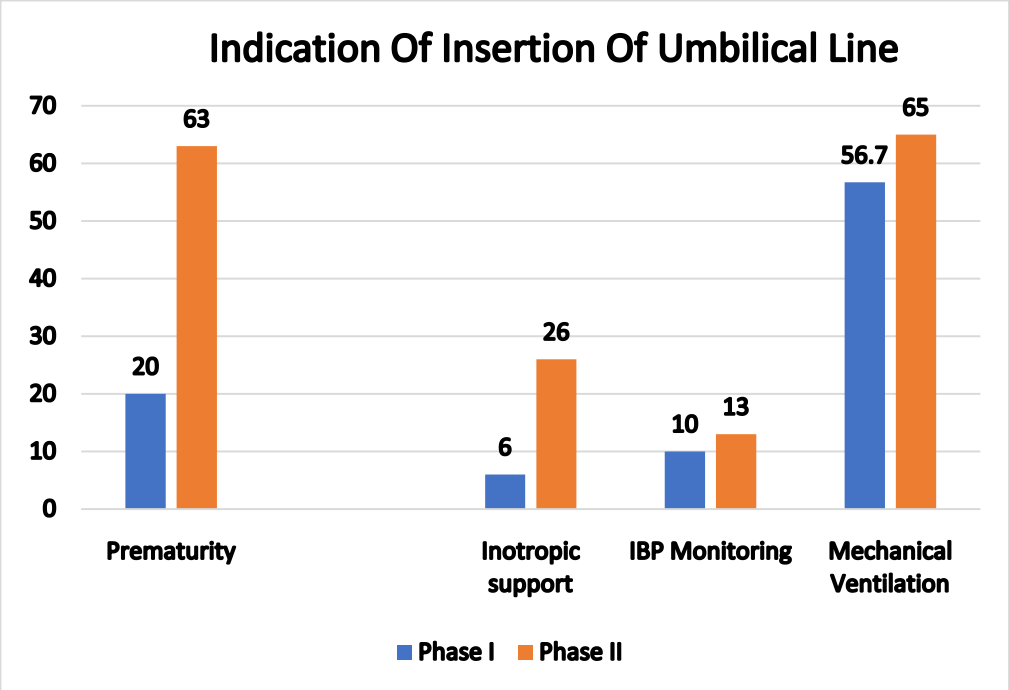


From the above table and graph it was observed that expressed breast milk feeding was reported in 100% subjects in both phases i.e., phase I& phase II.

Table 9: Indication Of Insertion Of Umbilical Line

Indication Of Insertion Of Umbilical Line			
	Phase I	**Phase II**	**P Value**
Prematurity	20	63	0.16
Inotropic support	6	26	
IBP Monitoring	10	13	
Mechanical Ventilation	56.7	64.8	

Figure 9: Indication Of Insertion Of Umbilical Line

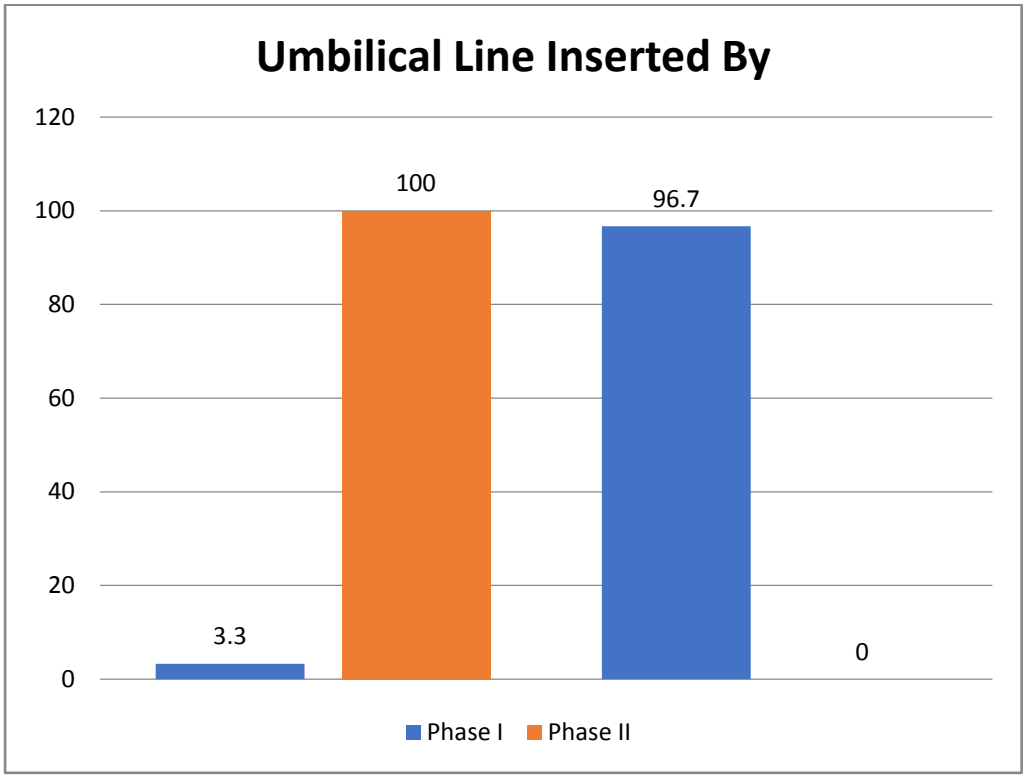


From the above table and graph it was observed that prematurity (20) and IBP monitoring (6) was the indication of insertion of umbilical line in phase I subjects. The study found out that prematurity (46), mechanical ventilation (42) and inotropic support (26) were the indication of insertion of umbilical line in phase II subjects.

Table 10: **Umbilical Line Inserted By**

		Phase I		Phase II		Total	Chi-square value	p-value
		No. of cases	%age	No. of cases	%age			
Umbilical line inserted by	Fellow	1	3.3%	71	100%	72	96.277	0.001
	JR	29	96.7%	0	0.0%	29		
Total		30	100%	71	100%	101		

Figure 10: Umbilical Line Inserted By

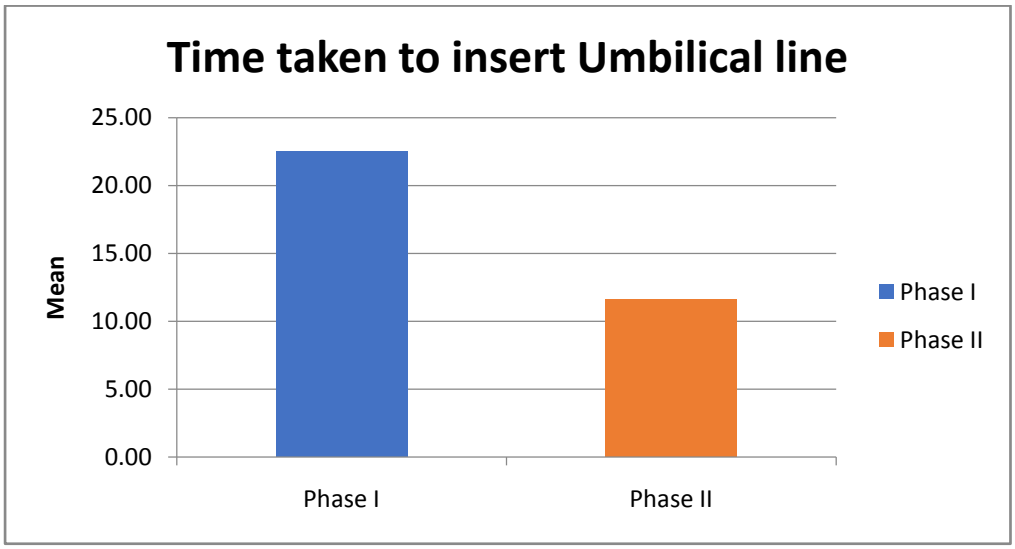


From the above table and graph it was observed that in phase I subjects umbilical line inserted by fellow in 3.3% and by junior resident in 96.7%. The study found out that in phase II umbilical line was inserted by fellow in 100% neonates.

Table 11: Time taken to insert umbilical line (minute)

		Phase I		Phase II		Total	Chi-square value	p-value
		No. of cases	%age	No. of cases	%age			
Time taken (MIN)	6	0	0.0%	1	1.4%	1	89.597	0.001
	7	0	0.0%	2	2.8%	2		
	8	0	0.0%	5	7.0%	5		
	9	0	0.0%	4	5.6%	4		
	10	0	0.0%	29	40.8%	29		
	11	0	0.0%	4	5.6%	4		
	12	0	0.0%	6	8.5%	6		
	13	0	0.0%	1	1.4%	1		
	15	0	0.0%	16	22.5%	16		
	20	20	66.7%	1	1.4%	21		
	25	5	16.7%	2	2.8%	7		
	30	5	16.7%	0	0.0%	5		
Total		30	100%	71	100%	101		

Figure11: Time taken to insert Umbilical line

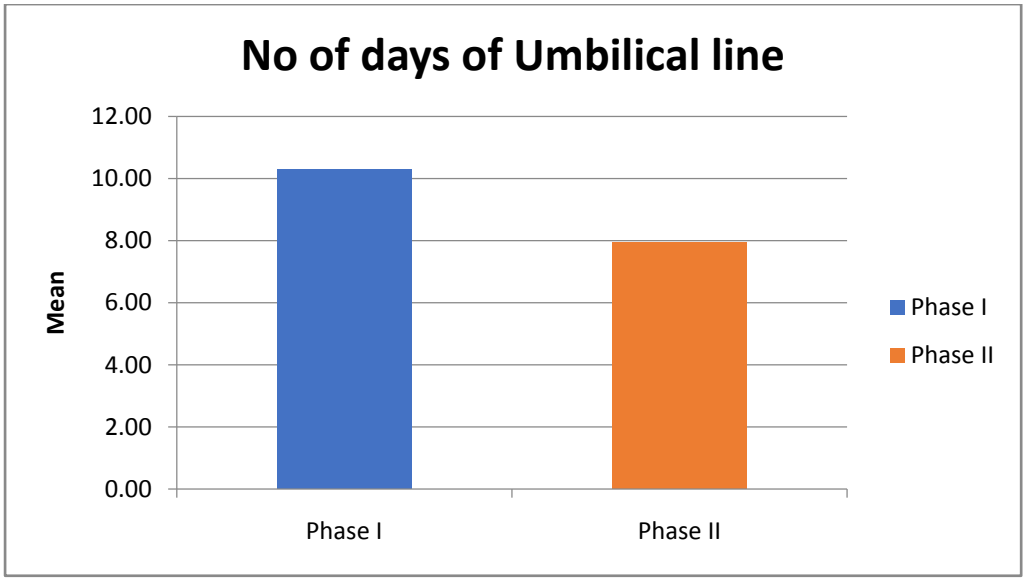


From the above table and graph it was observed that time taken by majority of the subjects in phase I was 20 min while it was 10 min in phase II.

Table 12: No of days of Umbilical line

	Phase I		Phase II		t	p-value	Difference	
	Mean	SD	Mean	SD			Mean Difference	Std. Error Difference
No of days of umbilical line	10.30	2.77	7.94	2.59	4.093	0.001	2.36	0.58

Figure 12: No of days of Umbilical line

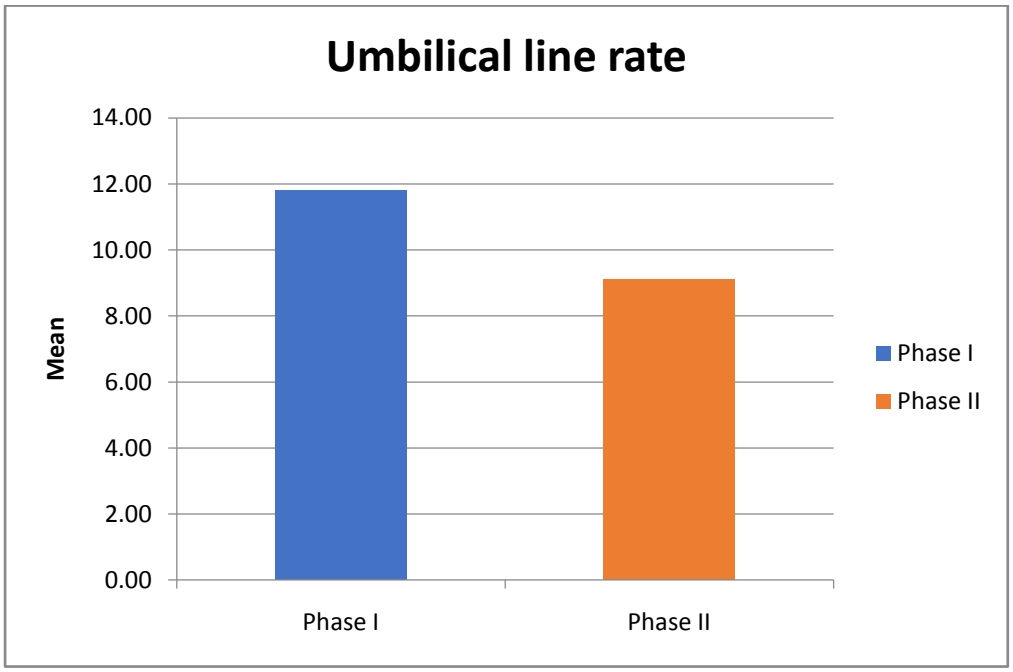


From the above table and graph it was observed that majority of subjects in phase I has longer duration of stay of umbilical line (mean 10.30± 2.77). The study found out that in phase II majority of subjects has shorter stay of umbilical line (7.94 ± 2.59) with the p Value of 0.001.

Table 13: **Umbilical line rate**

	Phase I		Phase II		t	p-value	Difference	
	Mean	SD	Mean	SD			Mean Difference	Std. Error Difference
umbilical line rate	11.80	3.17	9.10	2.97	4.093	0.001	2.70	0.66

Figure 13: Umbilical line rate

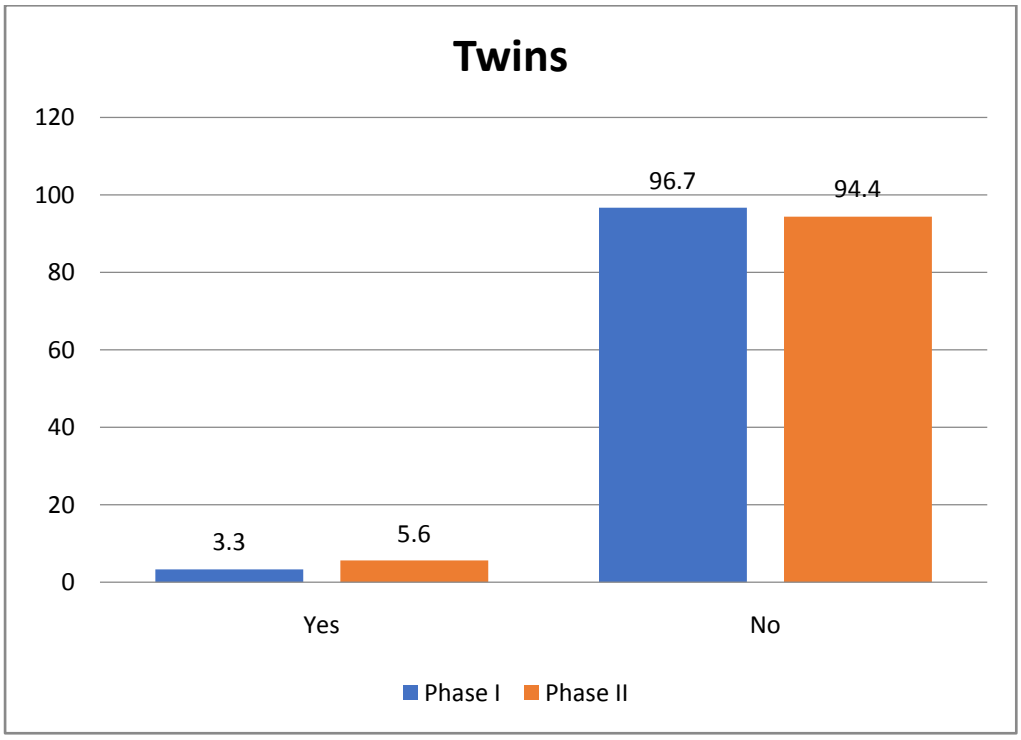


From the above table and graph it was observed that mean umbilical line rate was 11.80± 3.17 and 9.10±2.97 in phase I and phase II respectively.

Table 14: Baseline charaterstics

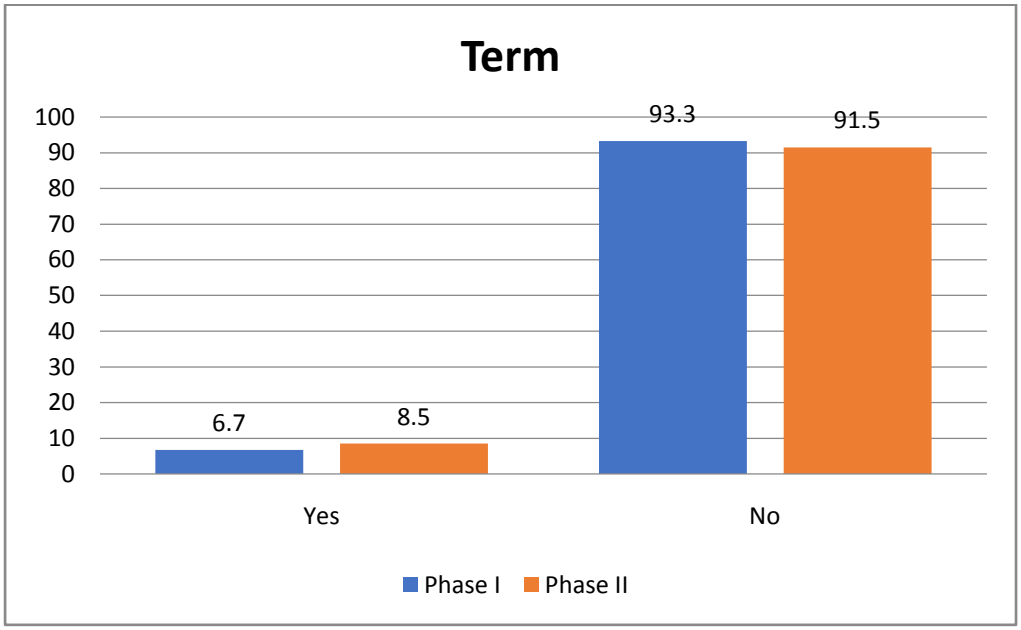
		Phase I		Phase II		Total	Chi-square value	p-value
		No. of cases	%age	No. of cases	%age			
Twins	N	29	96.7%	67	94.4%	96	0.237	0.626
	Y	1	3.3%	4	5.6%	5		
term	N	28	93.3%	65	91.5%	93	0.092	0.762
	Y	2	6.7%	6	8.5%	8		
Extrem preterm	N	25	83.3%	64	90.1%	89	0.933	0.333
	Y	5	16.7%	7	9.9%	12		
Early Preterm	N	24	80.0%	58	81.7%	82	0.039	0.843
	Y	6	20.0%	13	18.3%	19		
Late Preterm	N	13	43.3%	26	36.6%	39	0.401	0.527
	Y	17	56.7%	45	63.4%	62		
Appropriate for gestational	N	2	6.7%	10	14.1%	12	1.108	0.292
	Y	28	93.3%	61	85.9%	89		
SGA	N	28	93.3%	63	88.7%	91	0.500	0.479
	Y	2	6.7%	8	11.3%	10		
LGA	N	30	100%	69	97.2%	99	0.862	0.353
	Y	0	0.0%	2	2.8%	2		
LBW	N	29	96.7%	65	91.5%	94	0.856	0.355
	Y	1	3.3%	6	8.5%	7		
ELBW	N	26	86.7%	61	85.9%	87	0.010	0.920
	Y	4	13.3%	10	14.1%	14		
VLBW	N	25	83.3%	58	81.7%	83	0.039	0.844
	Y	5	16.7%	13	18.3%	18		

Figure 14: Twins



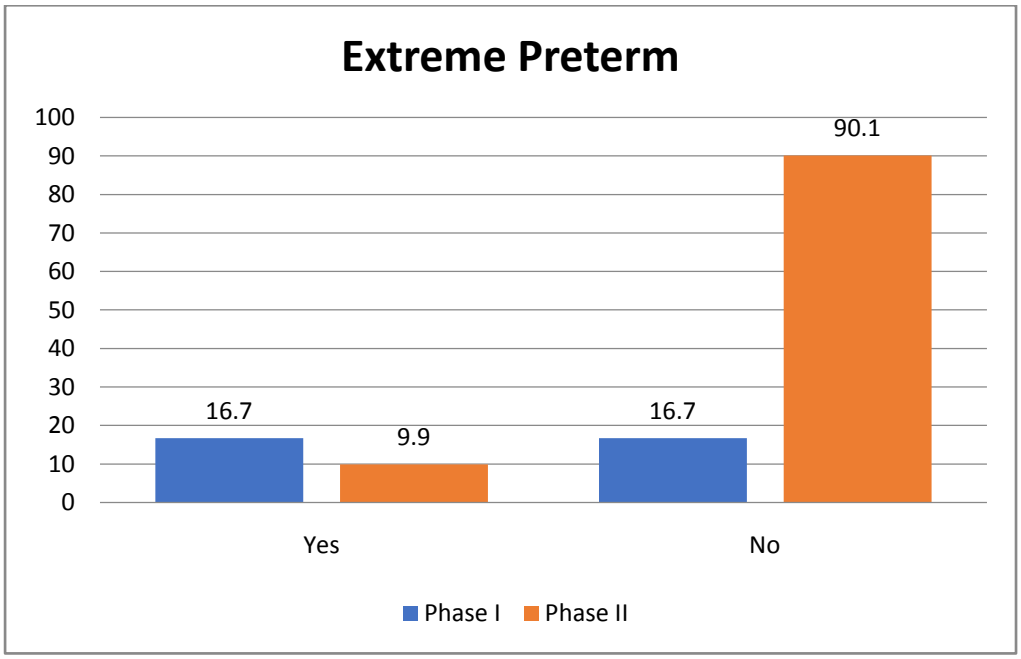
From the above table and graph it was observed that there were 3.3% twins in phase I while there were 5.6% twins in phase II.

Figure 15: Term



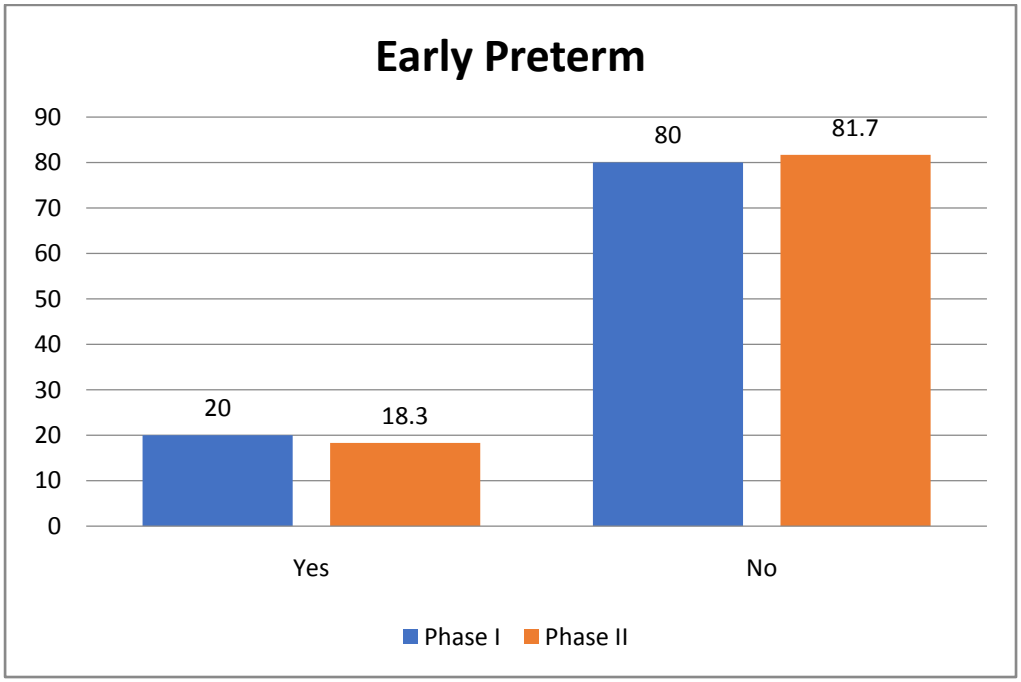
From the above table and graph it was observed that there were 6.7% term neonates in phase I while there were 8.5% term neonates in phase II.

Figure 16: Extreme preterm



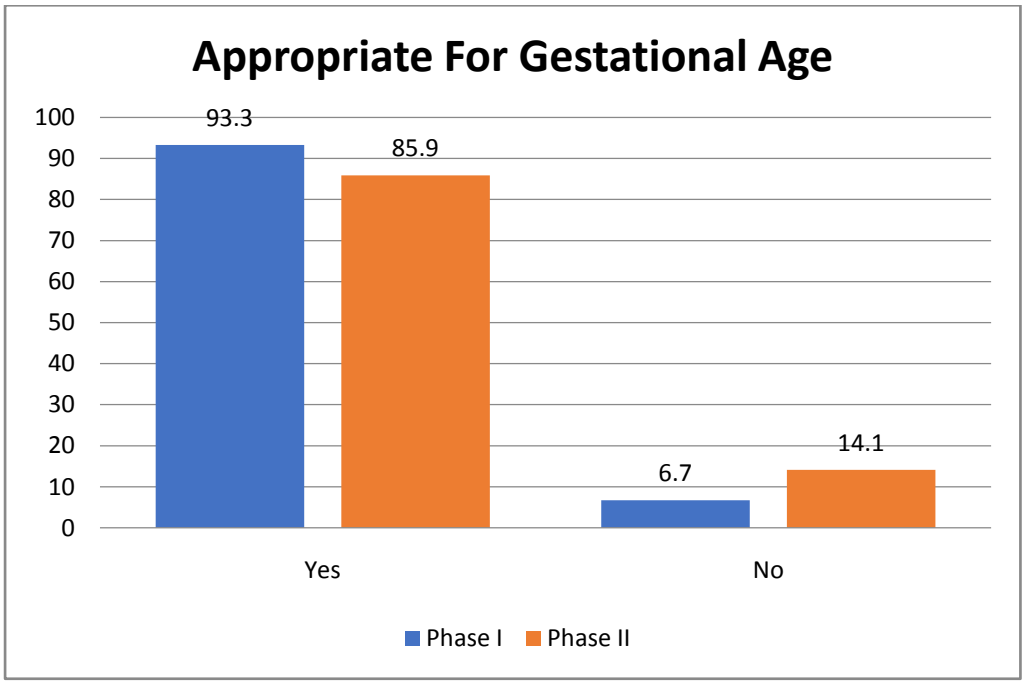
From the above table and graph it was observed that there were 16.7% extreme preterm neonates in phase I while there were 9.9% extreme preterm neonates in phase II.

Figure 17: Early Preterm



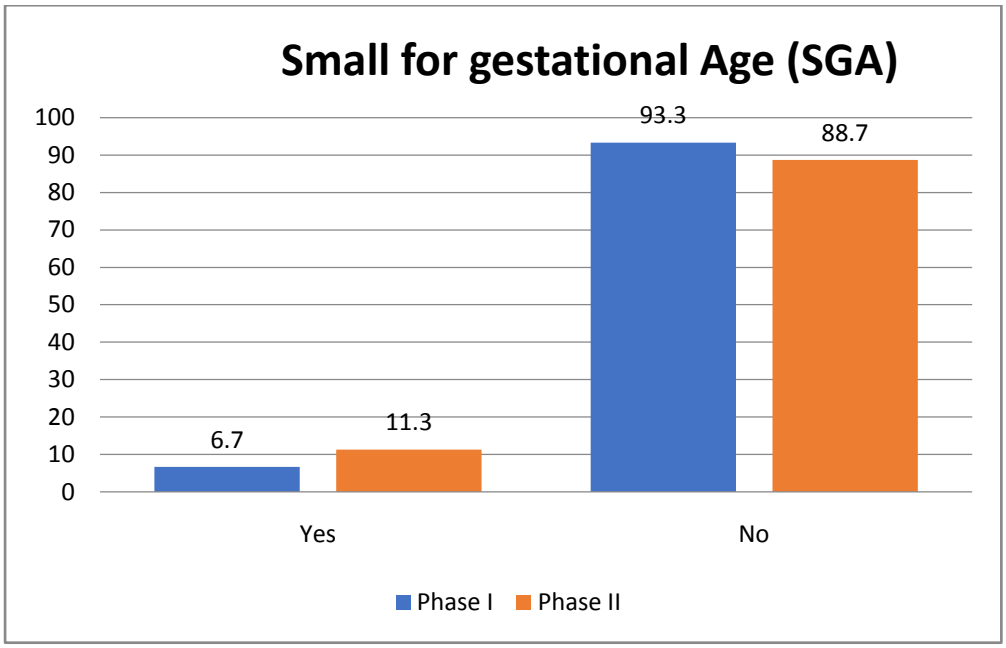
From the above table and graph it was observed that there were 20% early preterm neonates in phase I while there were 18.3% early preterm neonates in phase II.

Figure 18: Appropriate For Gestational Age



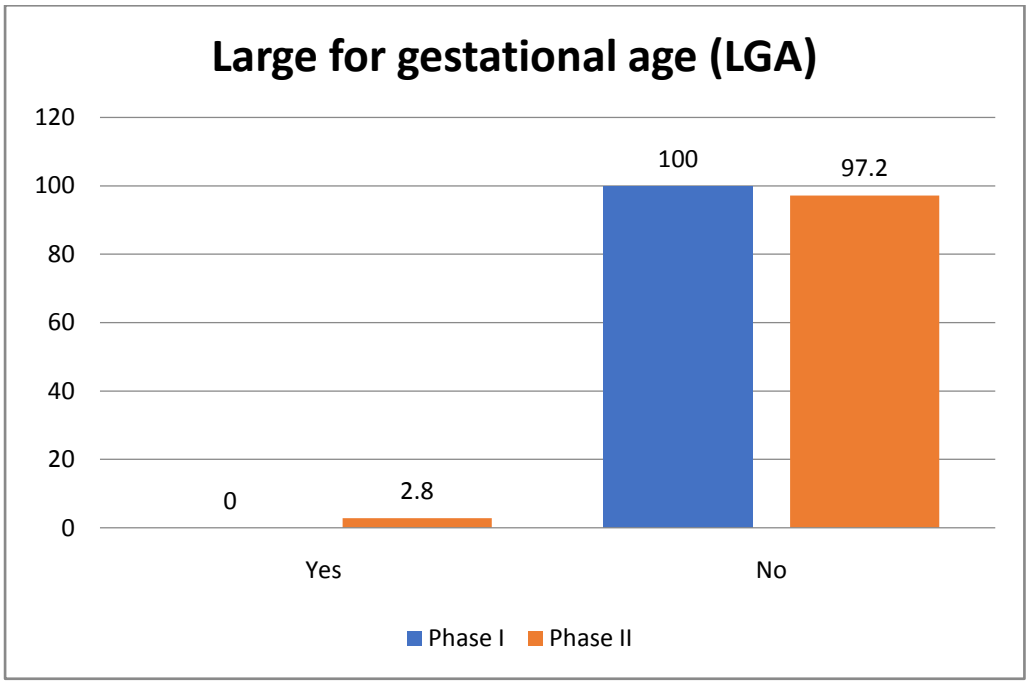
From the above table and graph it was observed that there were 93.3% neonates were appropriate for gestational in phase I while there were 85.9% neonates appropriate for gestational in phase II.

Figure 19: Small for gestational Age (SGA)



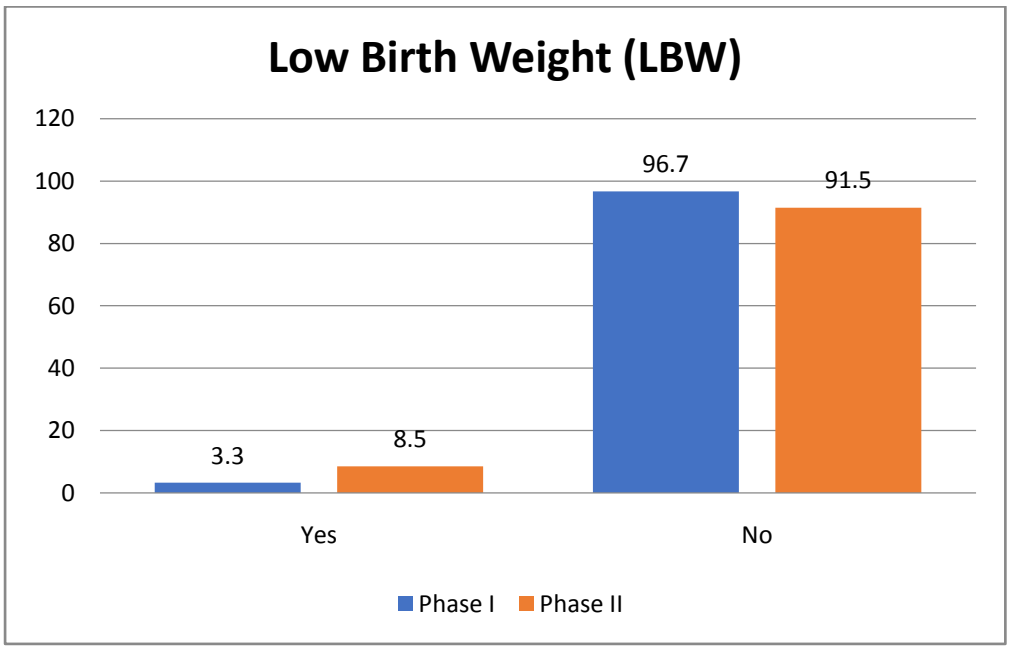
From the above table and graph it was observed that there were 6.7% SGA in phase I while there were 11.3% SGA in phase II.

Figure 20: Large for gestational age (LGA)



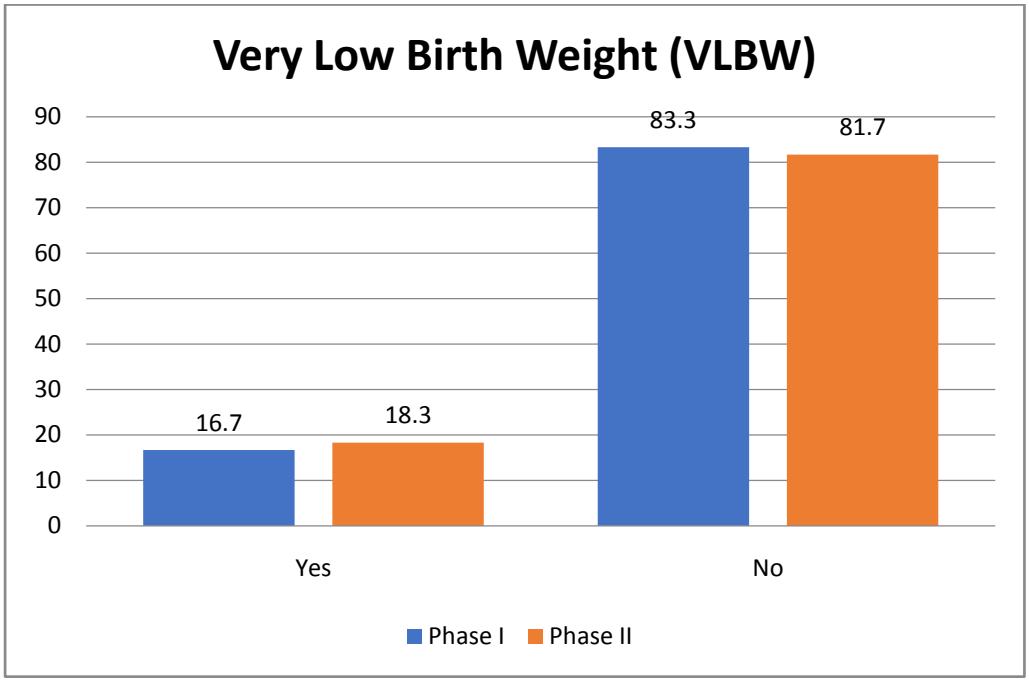
From the above table and graph it was observed that there were no any LGA in phase I while there were 2.8% LGA in phase II.

Figure 21: Low Birth Weight (LBW)



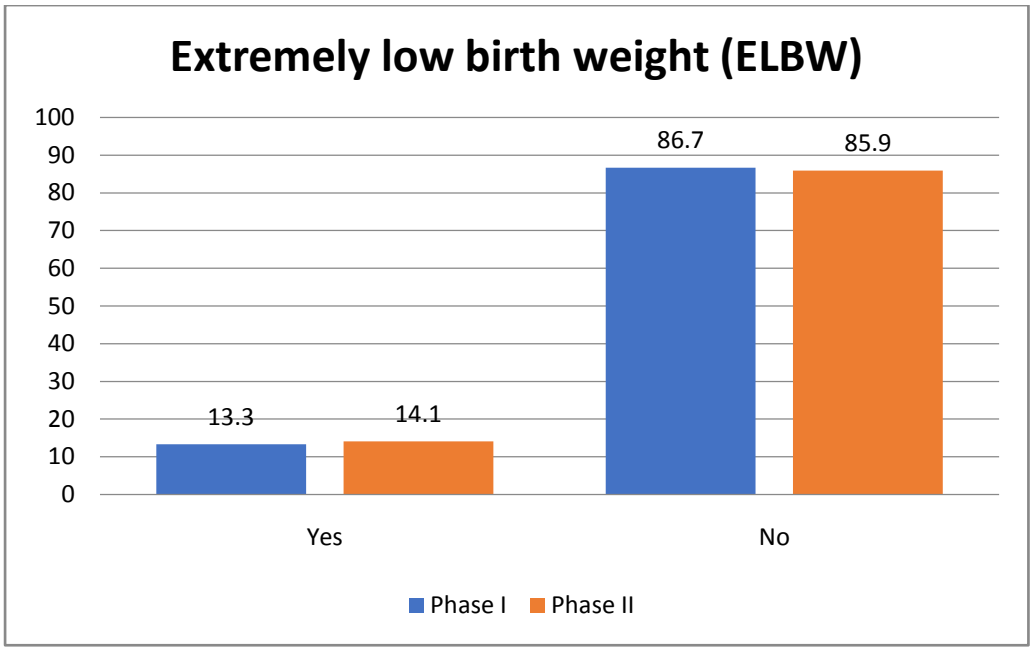
From the above table and graph it was observed that there were 3.3% LBW in phase I while there were 8.5% LBW in phase II.

Figure 22: Very Low Birth Weight (VLBW)



From the above table and graph it was observed that there were 16.7% VLBW in phase I while there were 18.3% VLBW in phase II.

Figure 23: Extremely low birth weight (ELBW)

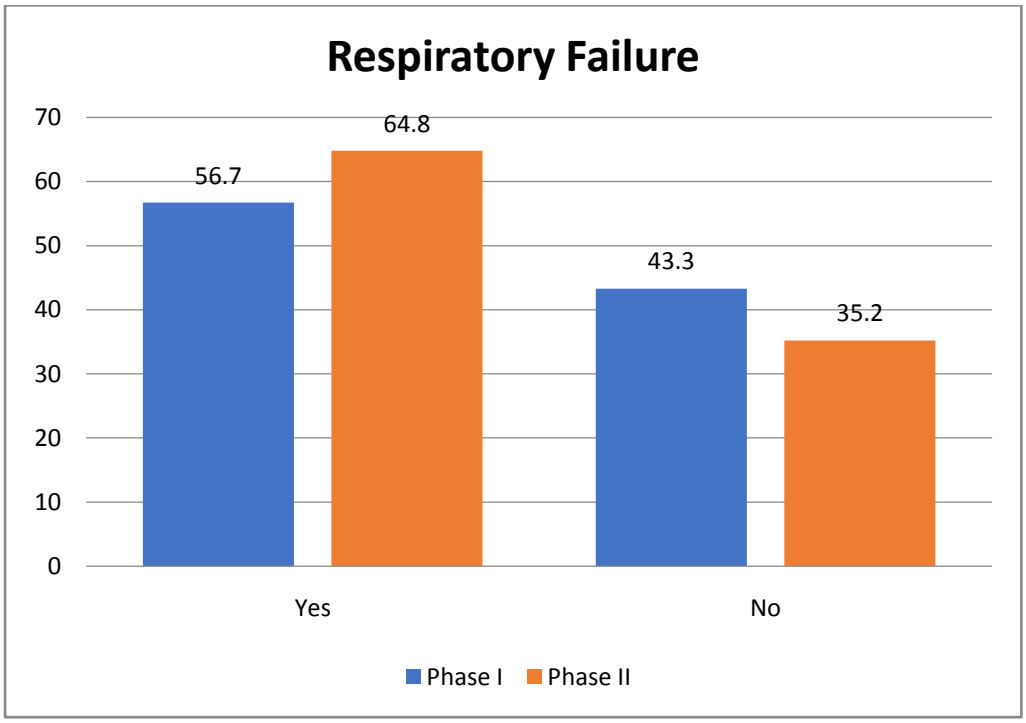


From the above table and graph it was observed that there were 13.3% ELBW in phase I while there were 14.1% ELBW in phase II.

Table 15: Respiratory and CNS involvement

Respiratory Failure	N	13	43.3%	25	35.2%	38	0.593	0.441
	Y	17	56.7%	46	64.8%	63		
Respiratory distress syndrome	N	7	23.3%	15	21.1%	22	0.060	0.806
	Y	23	76.7%	56	78.9%	79		
Meconium aspiration syndrome	N	30	100.0%	70	98.6%	100	0.427	0.514
	Y	0	0.0%	1	1.4%	1		
PPHN	N	30	100.0%	68	95.8%	98	1.306	0.253
	Y	0	0.0%	3	4.2%	3		
Cong pneumonia	N	24	80.0%	65	91.5%	89	2.687	0.174
	Y	6	20.0%	6	8.5%	12		
Seizures	N	29	96.7%	68	95.8%	97	0.044	0.834
	Y	1	3.3%	3	4.2%	4		
PNA	N	27	90.0%	57	80.3%	84	1.423	0.233
	Y	3	10.0%	14	19.7%	17		
HIE	N	30	100.0%	70	98.6%	100	0.427	0.514
	Y (HIE3)	0	0.0%	1	1.4%	1		

Figure 24: Respiratory Failure

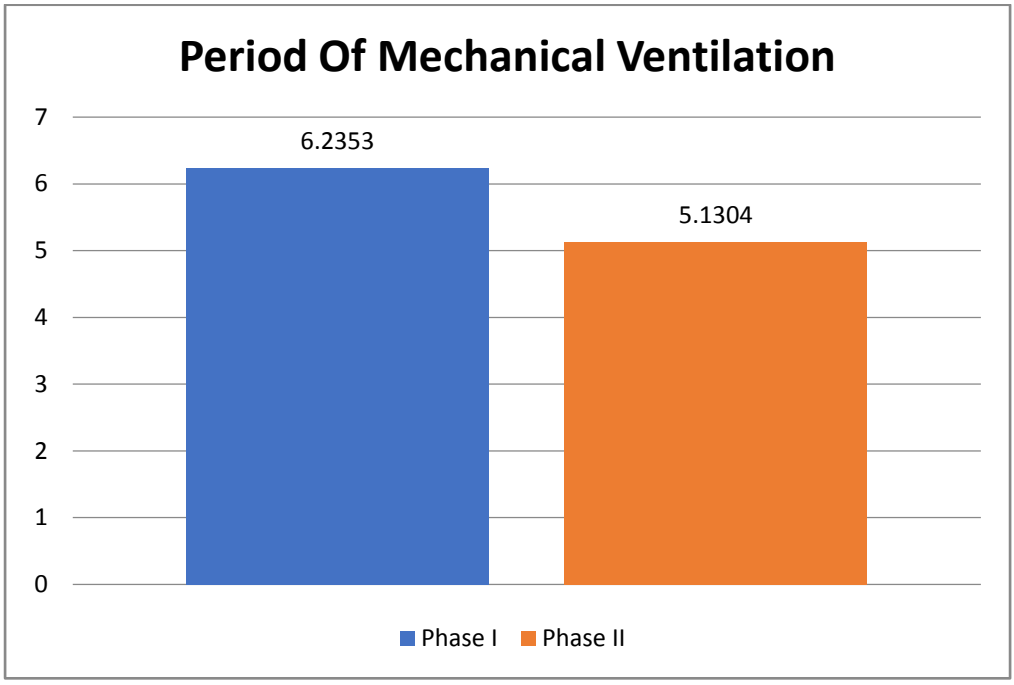


From the above table and graph it was observed that there in phase I subjects, respiratory failure was reported in 56.7% subjects while in phase II subjects, respiratory failure was reported in 64.8% subjects.

Table 16: Period of Mechanical Ventilation

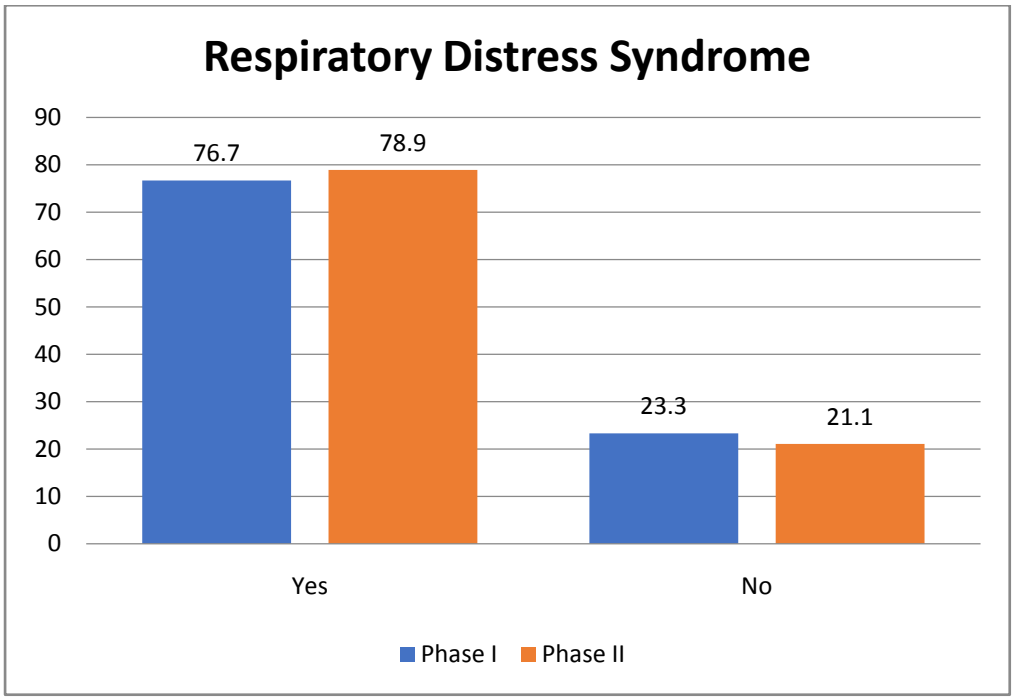
Period Of Mechanical Ventilation			
	Phase I	**Phase II**	**P Value**
Mean	6.2353	5.1304	0.001
Std. Deviation	2.33263	1.52911	

Figure 25: Period Of Mechanical Ventilation



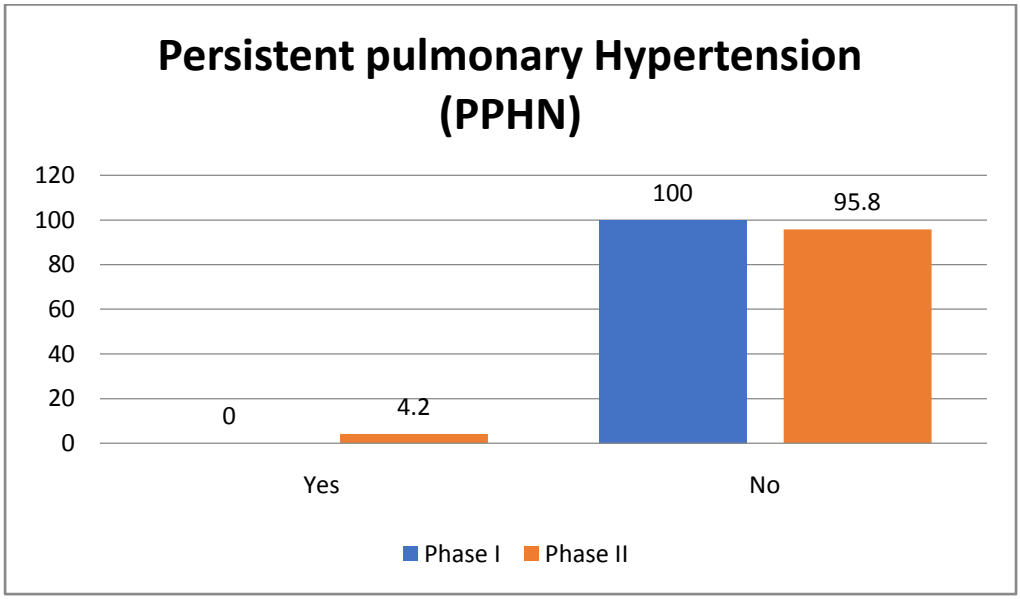
From the above table and graph it was observed that the mean period of mechanical ventilation was 6.23±2.33 and 5.13±1.52 in phase I and 2 respectively.

Figure 26: Respiratory Distress Syndrome



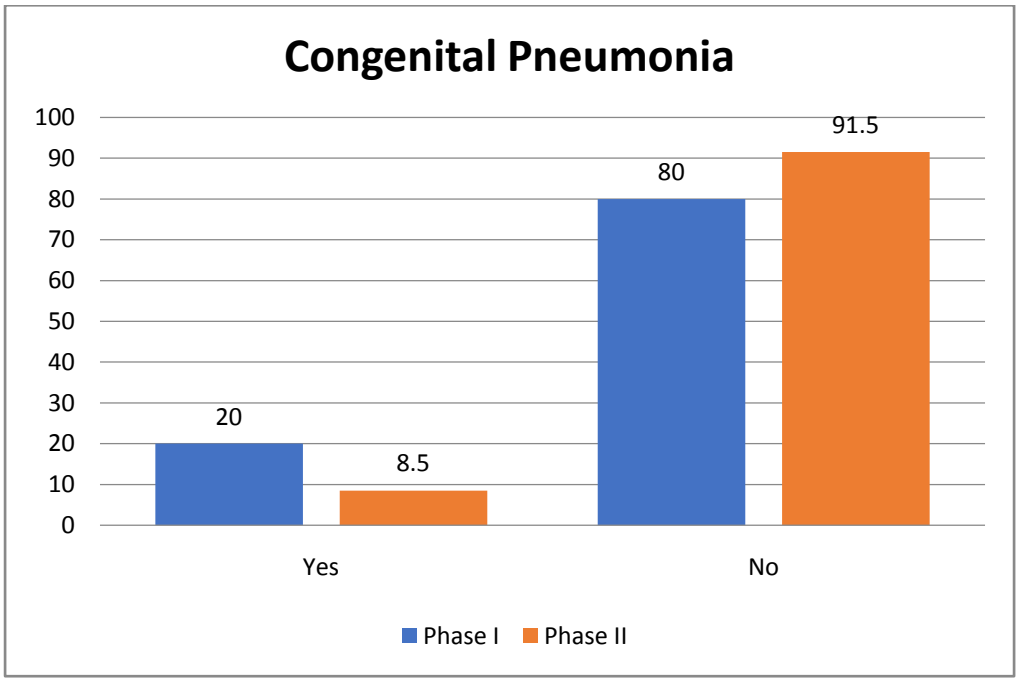
From the above table and graph it was observed that there in phase I subjects, respiratory distress syndrome was reported in 76.7% neonates while in phase II subjects, respiratory distress syndrome was reported in 78.9% neonates.

Figure 27: Persistent pulmonary Hypertension (PPHN)



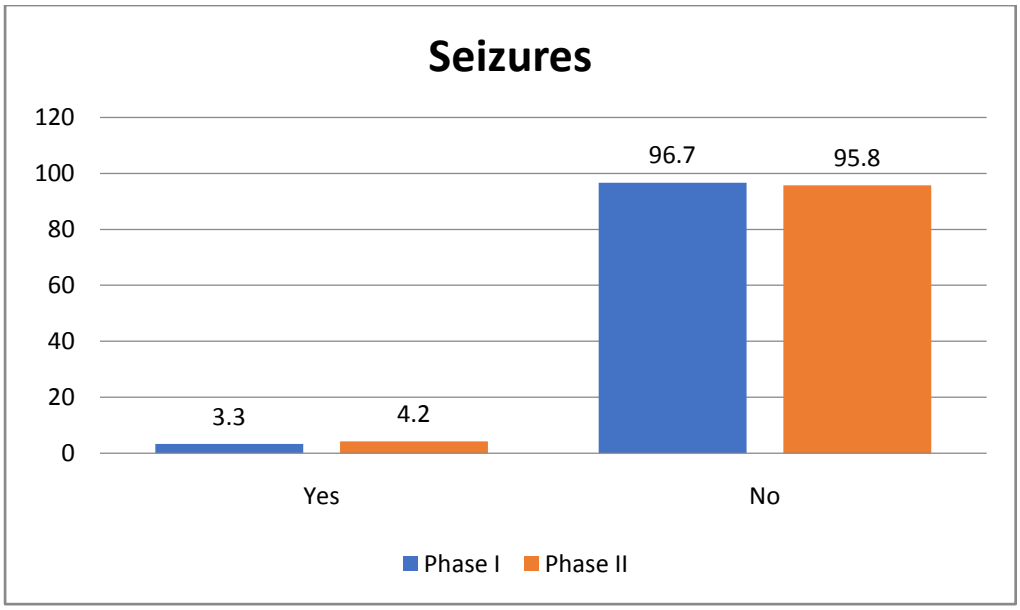
From the above table and graph it was observed that there in phase I subjects, PPHN was reported in 0 neonates while in phase II subjects, PPHN was reported in 4.2% neonates.

Figure 28: Congenital Pneumonia



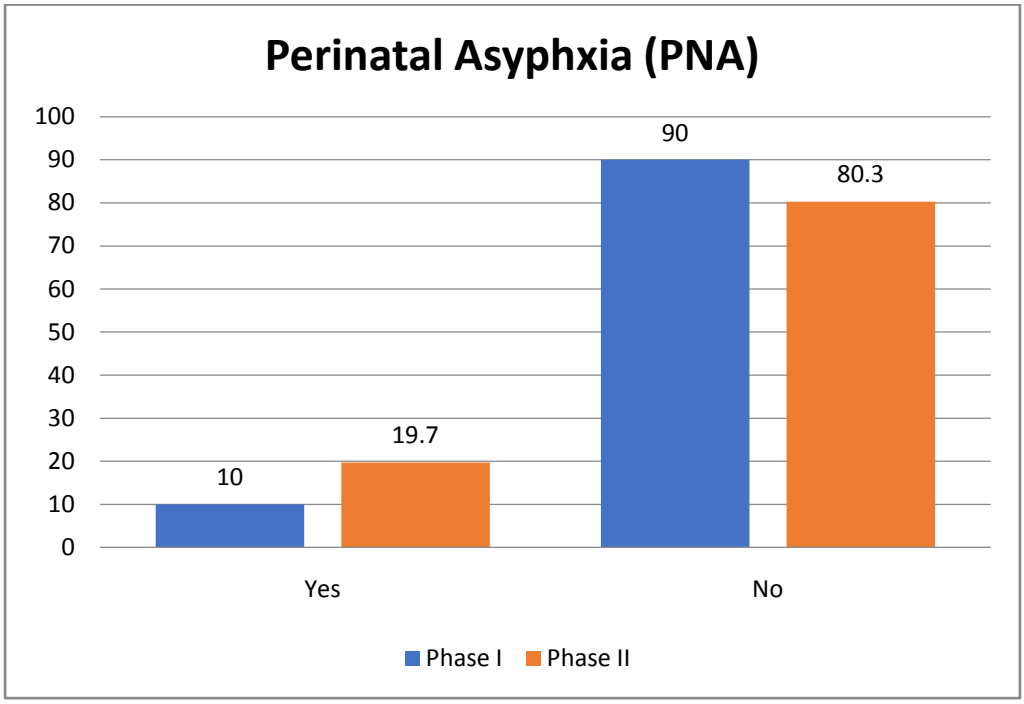
From the above table and graph it was observed that there in phase I subjects, congenital pneumonia was reported in 20% neonates while in phase II subjects, congenital pneumonia was reported in 8.5% neonates.

Figure 29: Seizures



From the above table and graph it was observed that there in phase I subjects, seizures were reported in 3.3% neonates while in phase II subjects, seizures were reported in 4.2% neonates.

Figure 30: Perinatal Asyphxia (PNA)



From the above table and graph it was observed that there in phase I subjects, PNA was reported in 10% neonates while in phase II subjects, PNA was reported in 19.7% neonates.

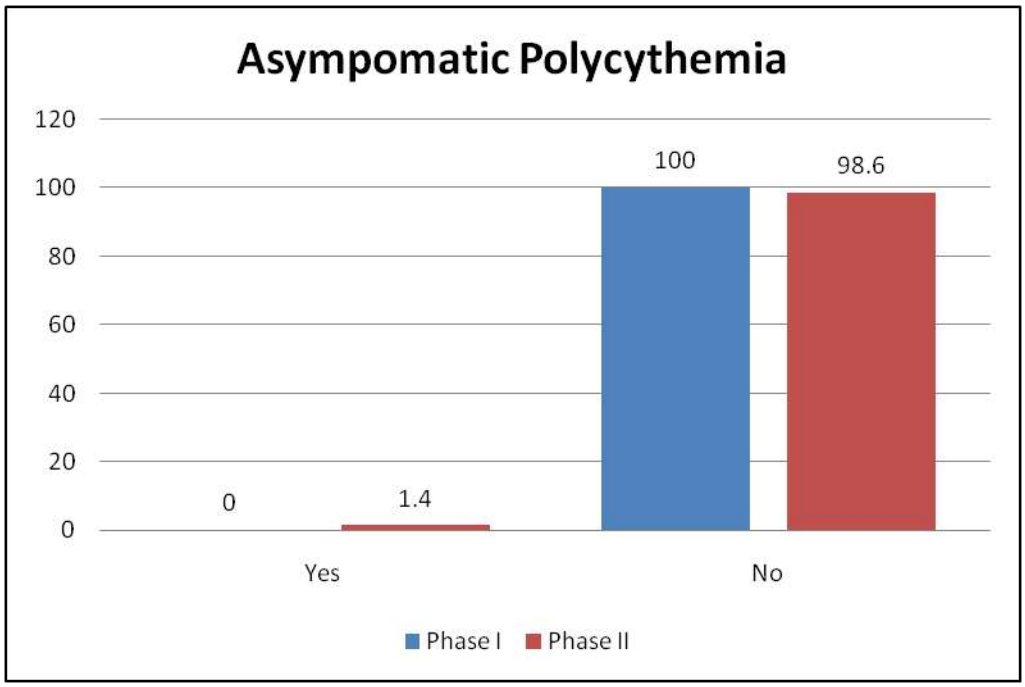
From the above table and graph it was observed that there in phase I subjects, Meconium Aspiration Syndrome was reported in 0% subjects while in phase II subjects, Meconium Aspiration Syndrome was reported in 1.4% subjects.

From the above table and graph it was observed that there in phase I subjects, HIE was reported in 0% subjects while in phase II subjects, HIE was reported in 1.4% subjects.

Table 17: Haematological and Metabolic Diseases

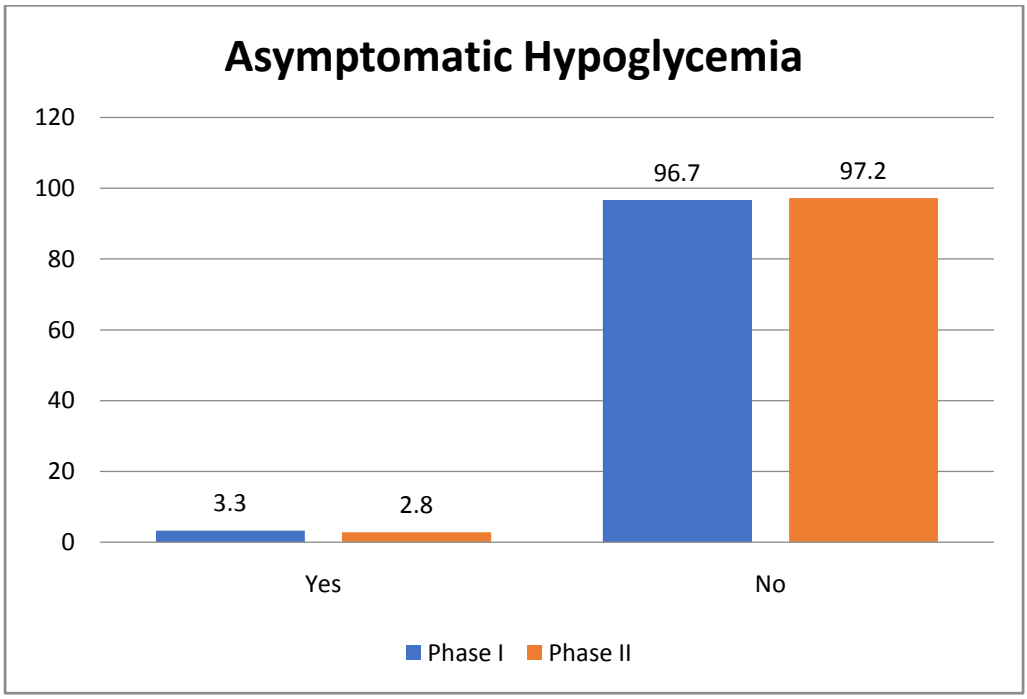
Asympomatic Polycythemia	N	30	100%	70	98.6%	100	0.427	0.514
	Y	0	0.0%	1	1.4%	1		
Asymptomatic hypoglycemia	N	29	96.7%	69	97.2%	98	0.020	0.889
	Y	1	3.3%	2	2.8%	3		
Metabolic Bone disease	N	30	100%	70	98.6%	100	0.427	0.514
	Y	0	0.0%	1	1.4%	1		

Figure 31: Asympomatic Polycythemia



From the above table and graph it was observed that there in phase I subjects, Asymptomatic Polycythemia was reported in 0 neonates while in phase II subjects, Asymptomatic Polycythemia was reported in 1.4% subjects.

Figure 32: Asymptomatic Hypoglycemia

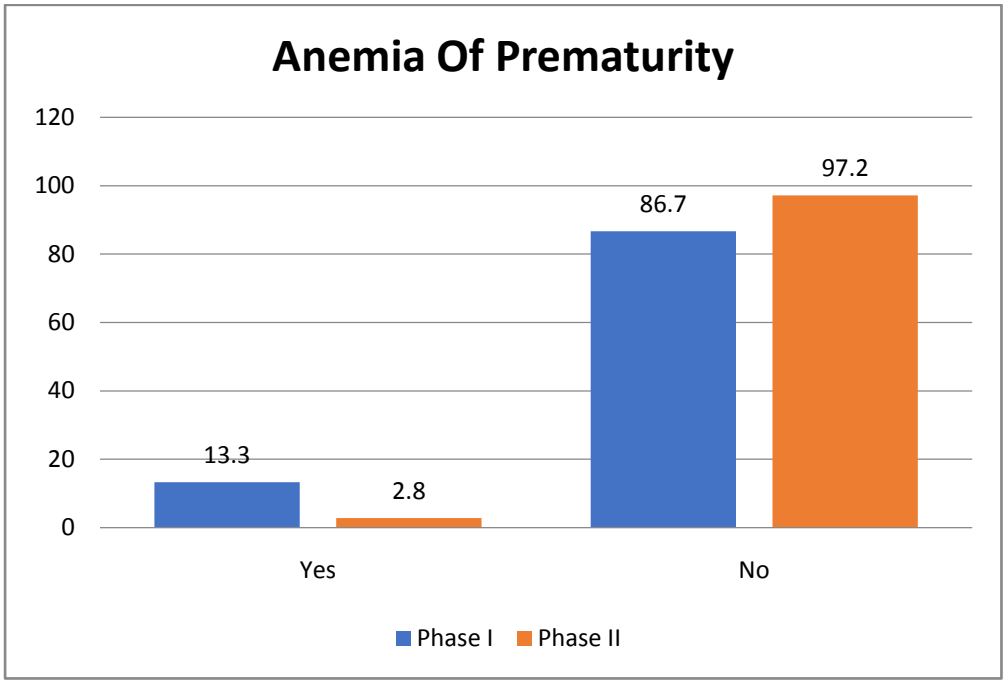


From the above table and graph it was observed that there in phase I subjects, Asymptomatic Hypoglycemia was reported in 3.3% subjects while in phase II subjects, Asymptomatic Hypoglycemia was reported in 2.8% subjects

Table 18: Diseases Related to prematurity

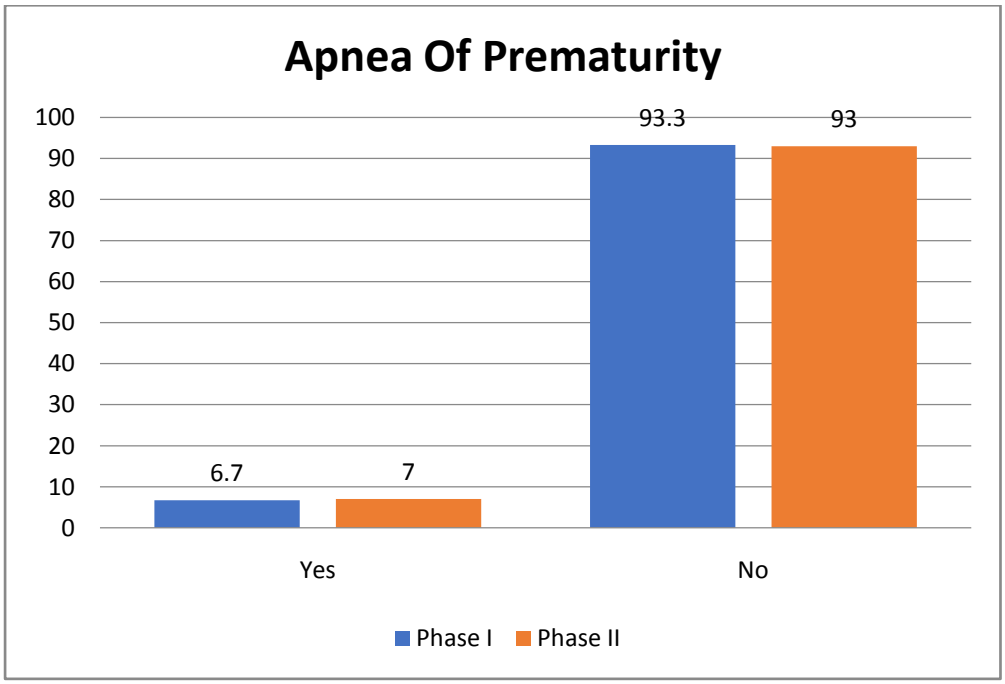
Anemia of prematurity	N	26	86.7%	69	97.2%	95	4.174	0.062
	Y	4	13.3%	2	2.8%	6		
Apnea of Prematurity	N	28	93.3%	66	93.0%	94	0.005	0.946
	Y	2	6.7%	5	7.0%	7		
Oedema of Prematurity	N	30	100%	71	100%	101		
Hyponatremia of prematurity	N	29	96.7%	70	98.6%	99	0.403	0.526
	Y	1	3.3%	1	1.4%	2		

Figure 33: Anemia Of Prematurity



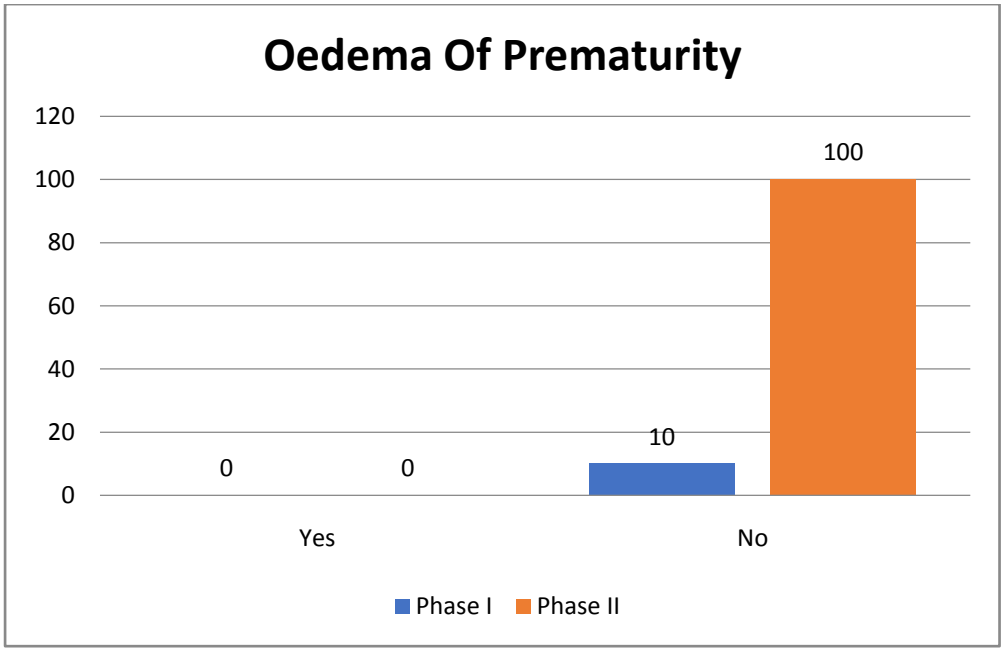
From the above table and graph it was observed that there in phase I subjects, Anemia Of Prematurity was reported in 13.3% subjects while in phase II subjects, Anemia Of Prematurity was reported in 2.8% subjects.

Figure 34: Apnea Of Prematurity



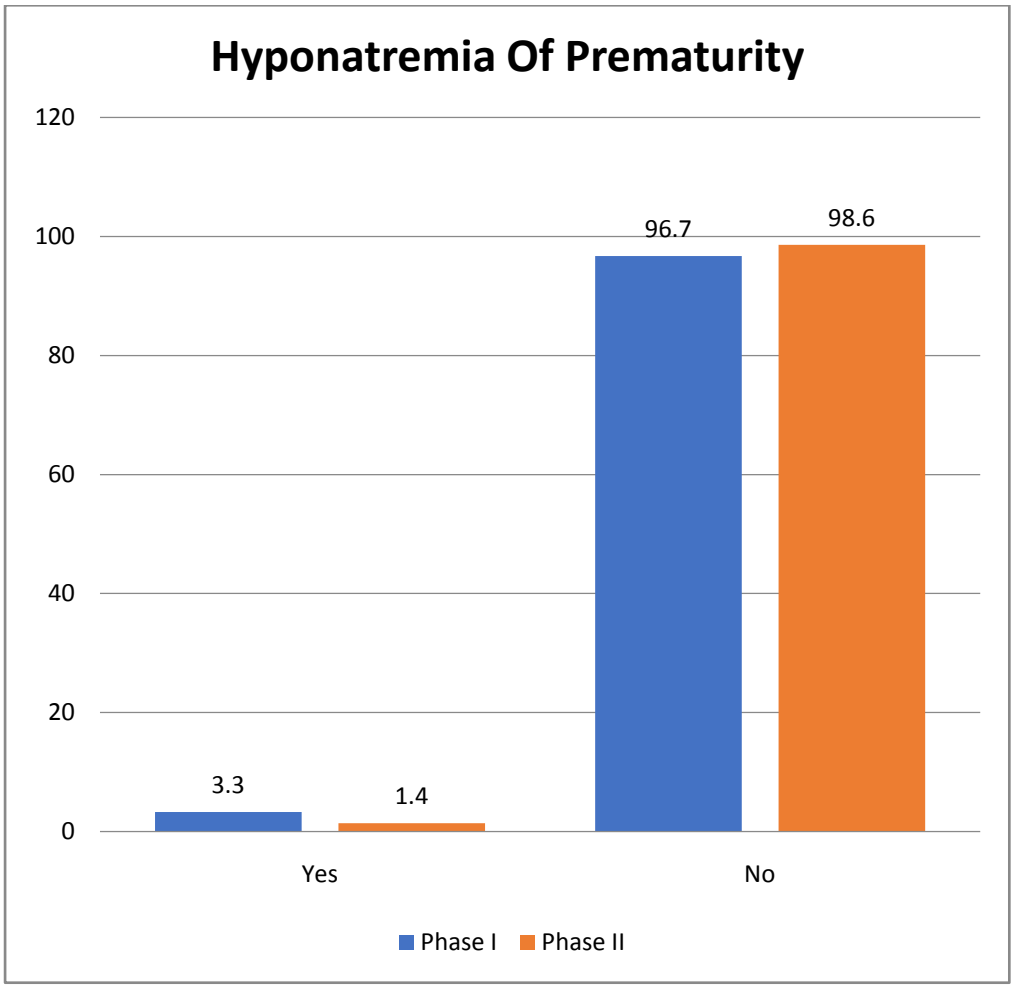
From the above table and graph it was observed that there in phase I subjects, Apnea Of Prematurity was reported in 6.7% subjects while in phase II subjects, Apnea Of Prematurity was reported in 7% subjects.

Figure 35: Oedema Of Prematurity



From the above table and graph it was observed that there in phase I subjects, Oedema Of Prematurity was reported in 0% subjects while in phase II subjects, Oedema Of Prematurity was reported in 0% subjects.

Figure36: Hyponatremia Of Prematurity

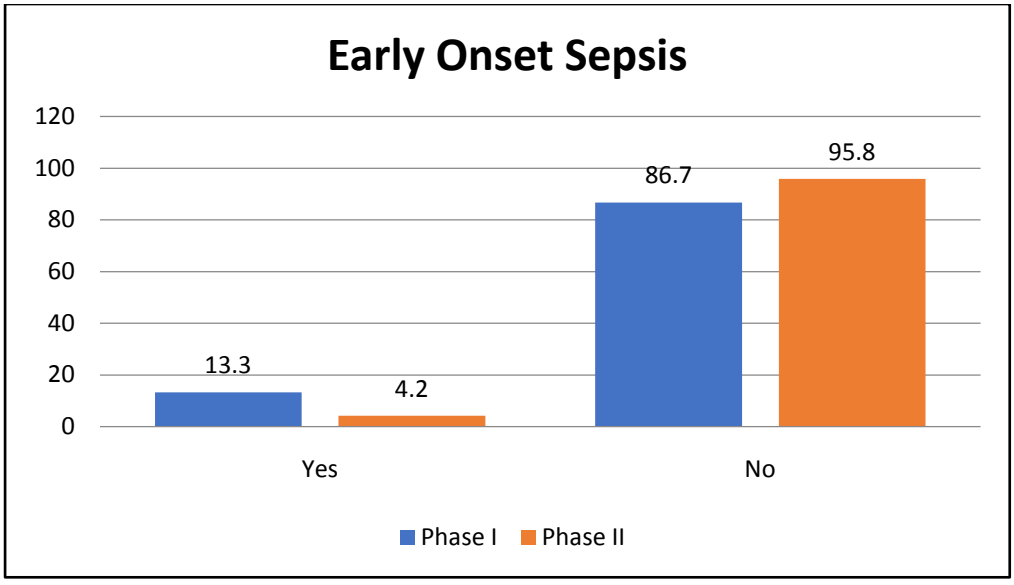


From the above table and graph it was observed that there in phase I subjects, Hyponatremia Of Prematurity was reported in 3.3% subjects while in phase II subjects, Hyponatremia Of Prematurity was reported in 1.4% subjects.

Table 19: Sepsis and other systems

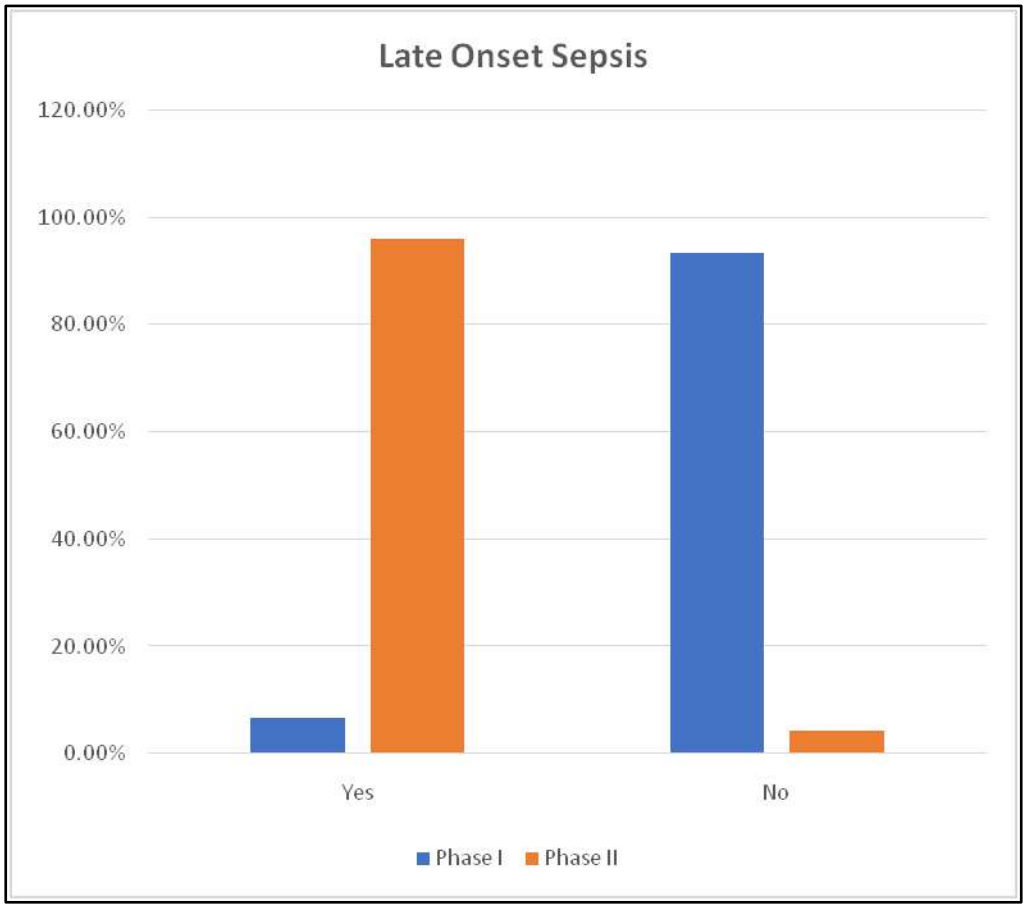
Early onset sepsis	N	26	86.7%	68	95.8%	94	2.712	0.192
	Y	4	13.3%	3	4.2%	7		
Late onset sepsis	N	28	93.3%	68	95.8%	96	0.267	0.605
	Y	2	6.7%	3	4.2%	5		
NEC	N	28	93.3%	64	90.1%	92	0.531	0.767
	Y	2	6.7%	7	9.9%	9		
TCP	N	27	90.0%	70	98.6%	97	4.093	0.077
	Y	3	10.0%	1	1.4%	4		
Neonatal hyperbilirubinemia	N	19	63.3%	39	54.9%	58	0.609	0.435
	Y	11	36.7%	32	45.1%	43		
RH isoimmunization	N	30	100.0%	69	97.2%	99	0.862	0.353
	Y	0	0.0%	2	2.8%	2		
RH-IVE PREGNANCY	N	28	93.3%	67	94.4%	95	0.040	0.841
	Y	2	6.7%	4	5.6%	6		

Figure 37: Early Onset Sepsis



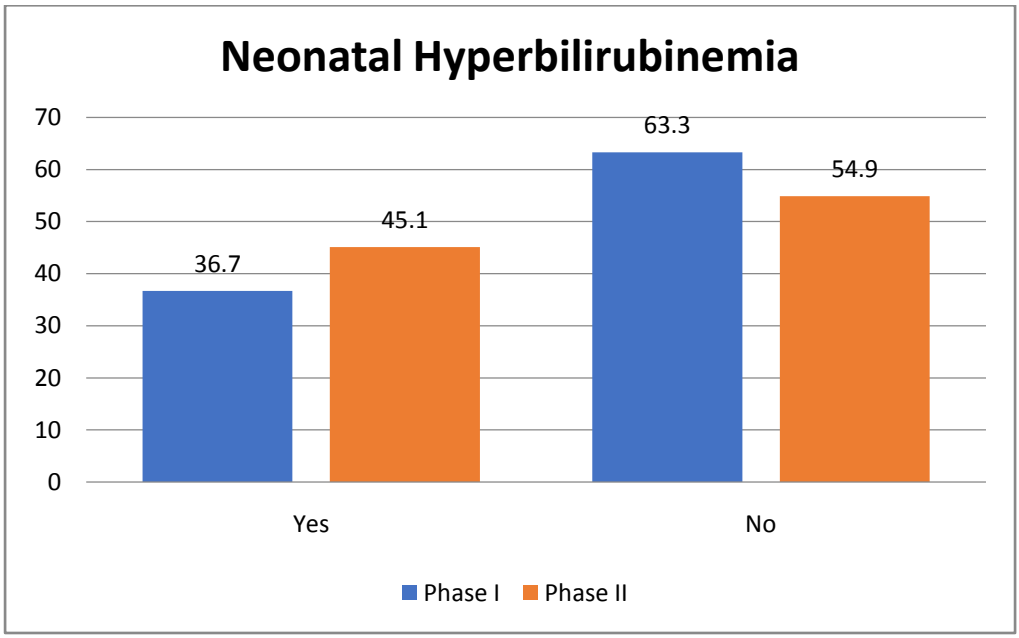
From the above table and graph it was observed that there in phase I subjects, early onset sepsis was reported in 13.3% neonates while in phase II subjects, early onset sepsis was reported in 4.2%neonates.

Figure 38: Late onset sepsis



From the above table and graph it was observed that there in phase I subjects, (late Onset Sepsis)LOS was reported in 6.7% subjects while in phase II subjects, LOS was reported in 4.2% subjects

Figure 39: Neonatal Hyperbilirubinemia



From the above table and graph it was observed that there in phase I subjects, Neonatal Hyperbilirubinemia was reported in 36.7% neonates while in phase II subjects, Neonatal Hyperbilirubinemia was reported in 45.1% neonates

From the above table it was observed that there in phase I subjects, (Necrotising enterocolitis) NEC was reported in 6.7% subjects while in phase II subjects, NEC was reported in 9.9% subjects.

From the above table it was observed that there in phase I subjects, (thrombocytopenia) TCP was reported in 10% subjects while in phase II subjects, TCP was reported in 1.4% subjects.

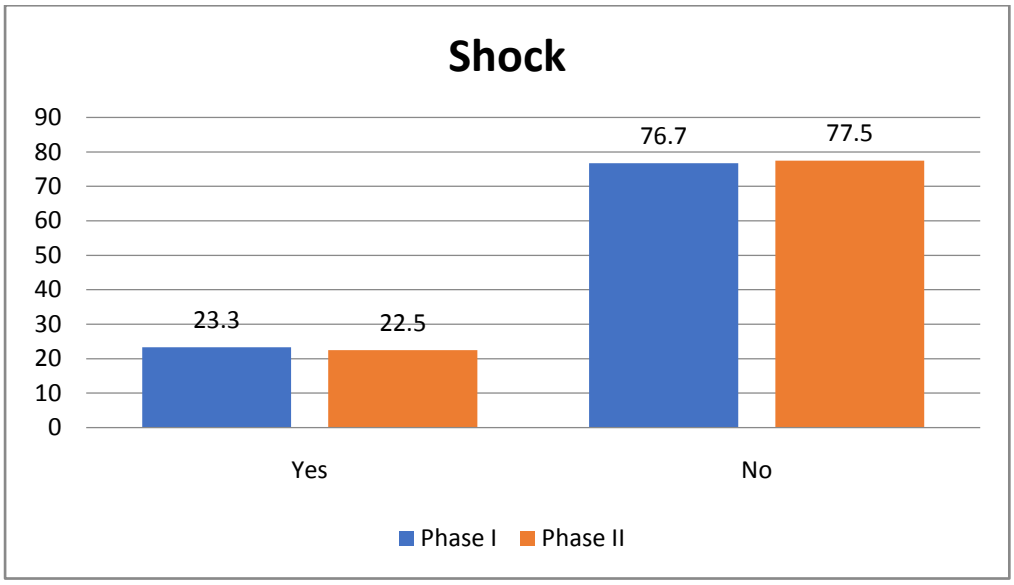
From the above table it was observed that there in phase I subjects, RH Isoimmunization was reported in 0% subjects while in phase II subjects, Bradycardia was reported in 2.8% subjects.

From the above tableit was observed that there in phase I subjects, RH-VE pregnancy was reported in 6.7% subjects while in phase II subjects, RH-VE pregnancy was reported in 5.6% subjects.

Table 20: Cardiovascular system involvement

Shock	N	23	76.7%	55	77.5%	78	0.008	0.930
	Y	7	23.3%	16	22.5%	23		
CONGENITAL HEART BLOCK	N	30	100%	70	98.6%	100	0.427	0.514
	Y	0	0.0%	1	1.4%	1		
MYOCARDITIS	N	30	100%	70	98.6%	100	0.427	0.514
	Y	0	0.0%	1	1.4%	1		
NEONATAL MIS-N	N	30	100%	70	98.6%	100	0.427	0.514
	Y	0	0.0%	1	1.4%	1		
Post CPR survivor	N	29	96.7%	67	94.4%	96	0.237	0.626
	Y	1	3.3%	4	5.6%	5		
Abnormal doppler	N	27	90.0%	69	97.2%	96	2.313	0.128
	Y	3	10.0%	2	2.8%	5		
Bradycardia	N	29	96.7%	70	98.6%	99	0.403	0.526
	Y	1	3.3%	1	1.4%	2		

Figure 40: Shock



From the above table and graph it was observed that there in phase I subjects, shock was reported in 23.3% neonates while in phase II subjects, shock was reported in 22.5% neonates.

From the above table it was observed that there in phase I subjects, Abnormal Doppler was reported in 10% subjects while in phase II subjects, Abnormal Doppler was reported in 2.8% subjects.

From the above table it was observed that there in phase I subjects, Bradycardia was reported in 3.3% subjects while in phase II subjects, Bradycardia was reported in 1.4% subjects.

From the above table it was observed that there in phase I subjects, congenital heart block was reported in 0% subjects while in phase II subjects, congenital heart block was reported in 1.4% subjects.

From the above table it was observed that there in phase I subjects, myocarditis was reported in 0% subjects while in phase II subjects, myocarditis was reported in 1.4% subjects.

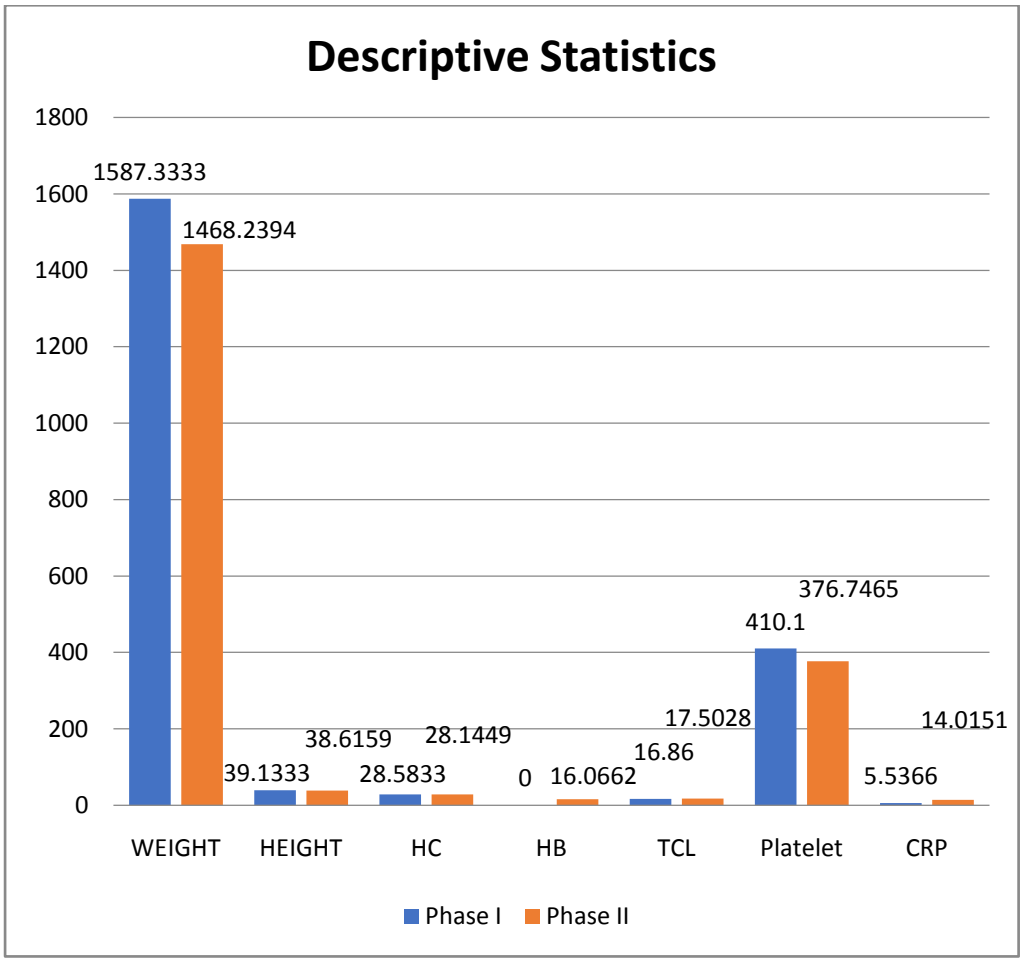
From the above table it was observed that there in phase I subjects, neonatal MIS-N was reported in 0% subjects while in phase II subjects, neonatal MIS-N was reported in 1.4% subjects.

From the above table it was observed that there in phase I subjects, Post CPR survivor was reported in 3.3% subjects while in phase II subjects, Post CPR survivor was reported in 5.6% subjects.

Table 21: Descriptive Statistics

Descriptive Statistics			
	Phase I	**Phase II**	**P Value**
Weight			
Mean	1587.3333 ± 736.79728	1468.2394 ± 630.83793	1.000
Height			
Mean	39.1333 ± 6.60581	38.6159 ± 5.69581	0.008
HC			
Mean	28.5833 ± 4.15660	28.1449 ± 3.86262	0.000
HB			
Mean	0.000	16.0662 ± 2.52835	1.000
Std. Deviation	0.000		
TCL			
Mean	16.8600 ± 5.63356	17.5028 ± 12.12223	0.997
Platelet			
Mean	410.1000 ± 194.64297	376.7465 ± 158.33732	1.000
CRP			
Mean	5.5366 ± 7.44208	14.0151 ± 32.54853	1.000
PCT			
Mean		0.6500 ± 2404	1.000

Figure 41: Descriptive Statistics



From the above table and graph it was observed that mean weight of subjects in phase I and phase II was 1587.3333 ± 736.79728 g and 1468.2394 ± 630.83793 g respectively.

From the above table and graph it was observed that mean height of subjects in phase I and phase II was 39.1333 ± 6.60581 and 38.6159 ± 5.69581 respectively.

From the above table and graph it was observed that mean HC of subjects in phase I and phase II was 28.5833 ± 4.15660 and 28.1449 ± 3.86262 respectively.

From the above table and graph it was observed that mean HB of subjects in phase II was 16.0662 ± 2.52835.

From the above table and graph it was observed that mean TCL of subjects in phase I and phase II was 16.8600 ± 5.633 and 17.5028 ± 12.122 respectively.

From the above table and graph it was observed that mean platelet of subjects in phase I and phase II was 410.1000 ± 194.64 and 376.7465 ± 158.33 respectively.

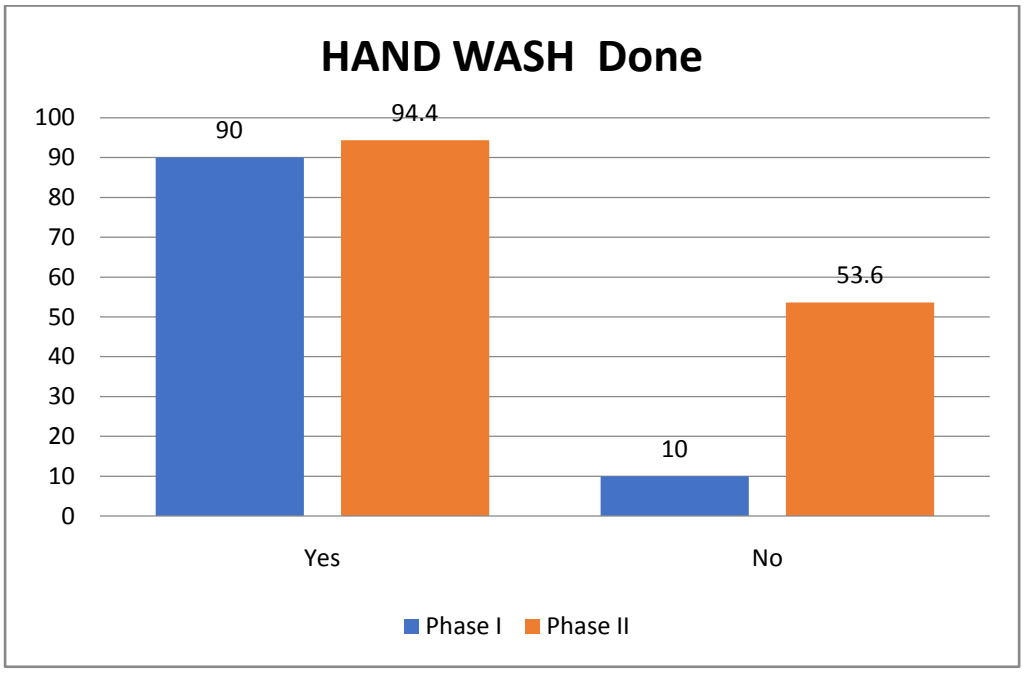
From the above table and graph it was observed that mean CRP of subjects in phase I and phase II was 5.5366 ± 7.44 and 14.0151 ± 32.54 respectively.

From the above table and graph it was observed that mean PCT of subjects in phase II was 0.6500 ± 2404.

Table 22: Hand wash

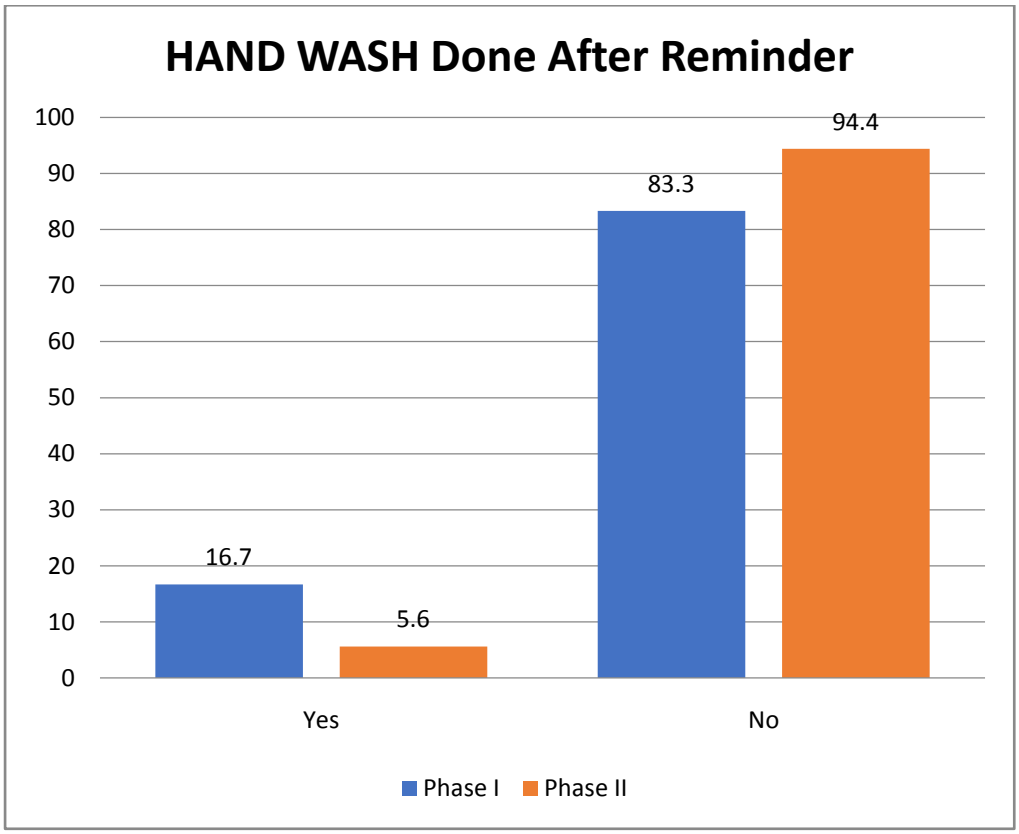
	Phase I	Phase II	P Value
HAND WASH Done			
Yes	27 (90.0)	67 (94.4)	0.001
No	3 (10.0)	4 (53.6)	
Total	30 (100.0)	71 (100.0)	
HAND WASH Done After Reminder			
Yes	5 (16.7)	4 (5.6)	0.001
No	25 (83.3)	67 (94.4)	
Total	30 (100.0)	71 (100.0)	
HAND WASH Adequate Time For Hand Hygiene			
Yes	0 (0.00)	68 (95.8)	0.00
No	0 (0.00)	3 (4.2)	
Total	0 (00.0)	71 (100.0)	

Figure 42: Hand wash done



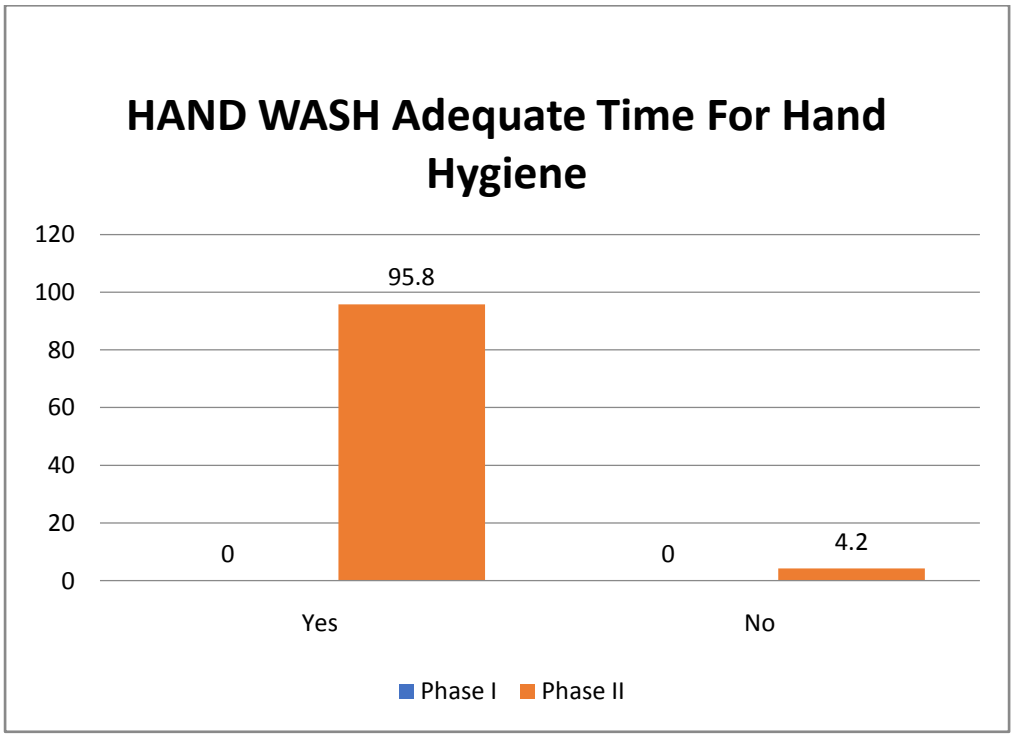
From the above table and graph it was observed that hand wash was performed in 90% and 94.4% cases of phase I and 2 respectively.

Figure 43: Hand wash adequate time for hand hygiene



From the above table and graph it was observed that hand wash was done after reminder in 16.7% and 5.6% cases of phase I and 2 respective.

Figure 44: Hand wash Adequate Time For Hand Hygiene

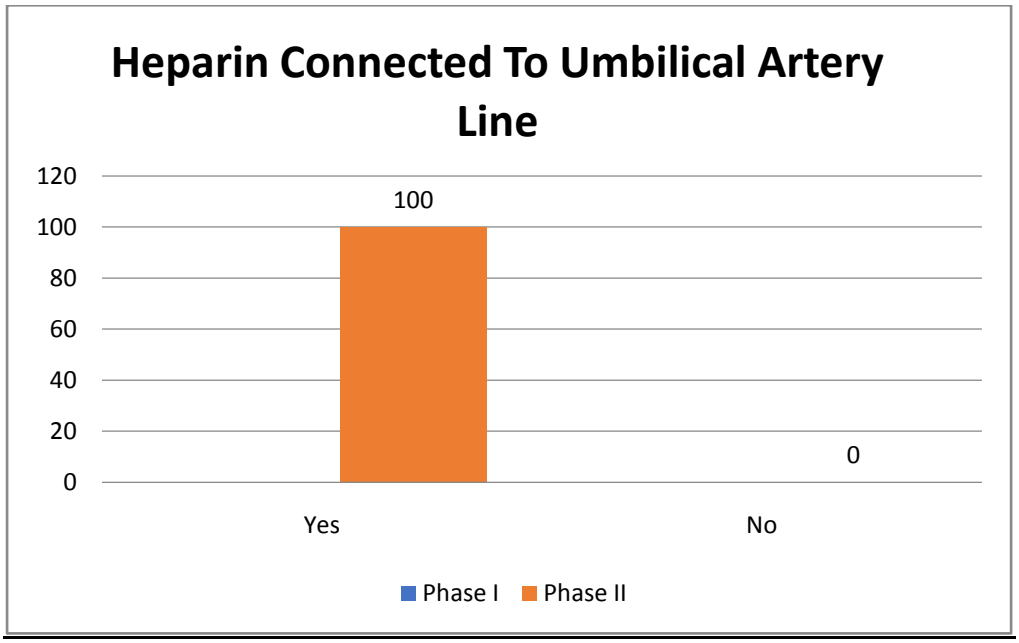


From the above table and graph it was observed that hand wash Adequate Time For Hand Hygiene was given in 0% and 95.8% cases of phase I and 2 respectively.

Table 23: Procedure Checklist 1

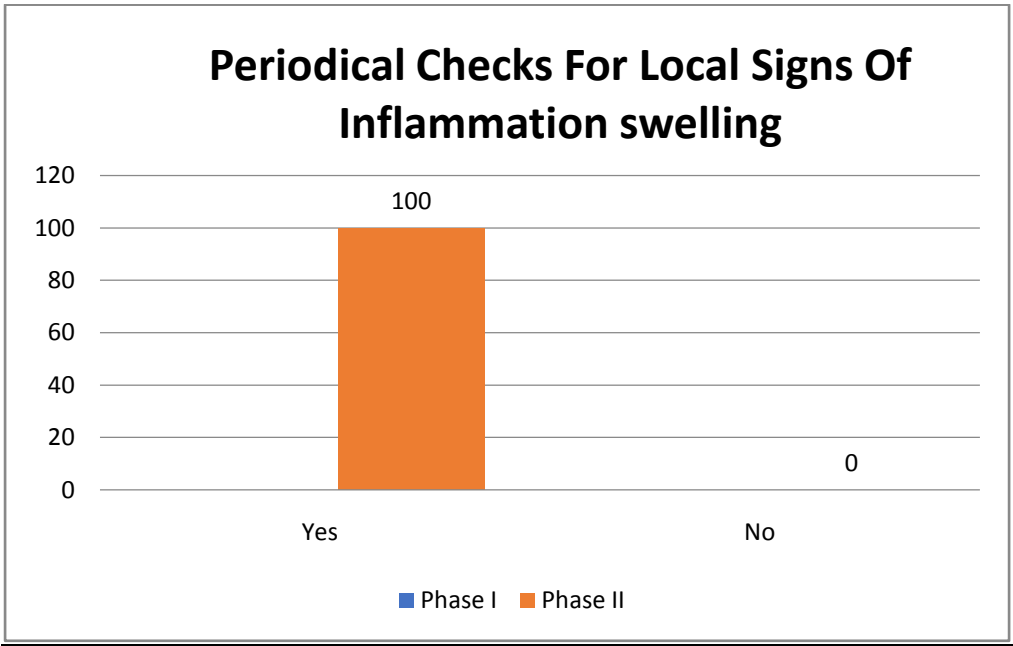
	Phase I	Phase II	P Value
Heparin Connected To Umbilical Artery Line			
Yes	0 (0.00)	71 (100.0)	0.000
No	0 (0.00)	0 (0.00)	
Total	0 (00.0)	71 (100.0)	
Periodical Checks For Local Signs Of Inflammation and swelling			
Yes	0 (0.00)	71 (100.0)	0.000
No	0 (0.00)	0 (0.00)	
Total	0 (00.0)	71 (100.0)	
Watch For Lower Limb Colour And Perfusion			
Yes	0 (0.00)	71 (100.0)	0.000
No	0 (0.00)	0 (0.00)	
Total	0 (00.0)	71 (100.0)	
Assemble equipment/verify supplies			
Yes	0 (0.00)	71 (100.0)	0.000
No	0 (0.00)	0 (0.00)	
Total	0 (00.0)	71 (100.0)	

Figure 45: Heparin Connected To Umbilical Artery Line



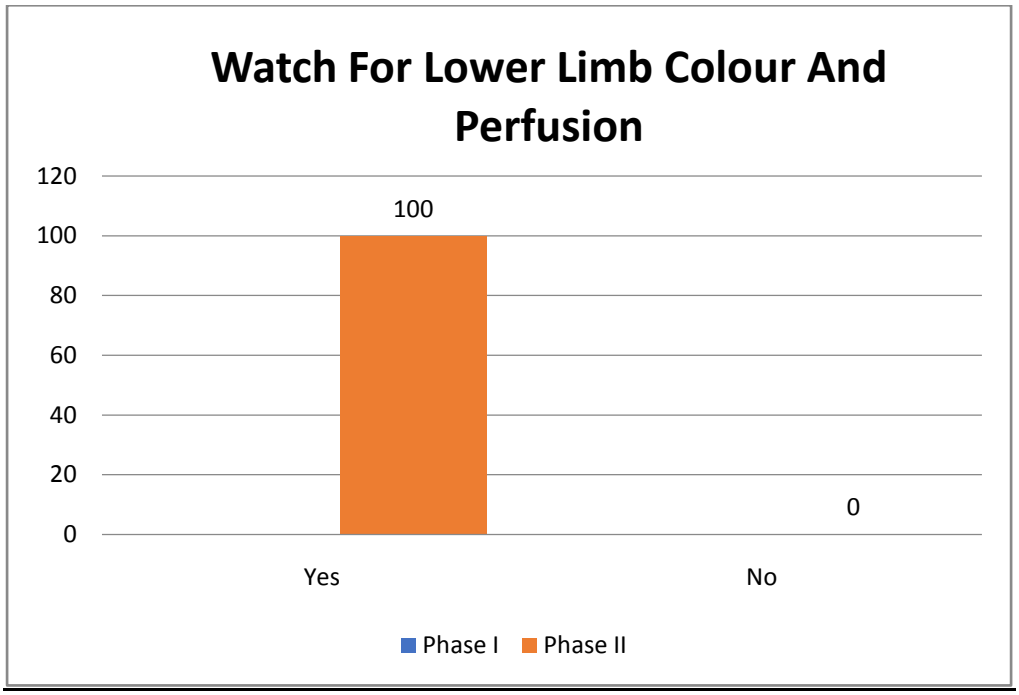
From the above table and graph it was observed that no heparin connected to umbilical artery line in phase I subjects while it was connected for 100% subjects of phase II.

Figure 46: Periodical Checks For Local Signs Of Inflammationswelling



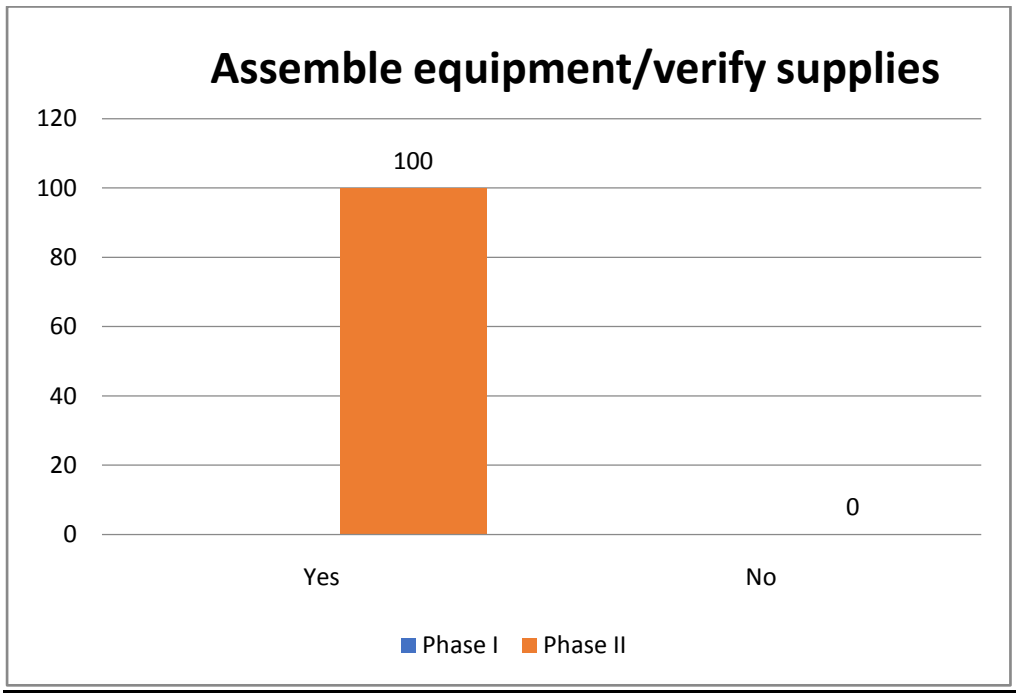
From the above table and graph it was observed that no Periodical Checks For Local Sighs Of Inflammation/swelling was performed in phase I subjects while it was performed for 100% subjects of phase II.

Figure 47: Watch For Lower Limb Colour And Perfusion



From the above table and graph it was observed that watch for lower limb colour and perfusion was performed in 100% subjects of phase II.

Figure 48: Assemble equipment/verify supplies



From the above table and graph it was observed that assemble equipment/verify supplies was used for 100% subjects of phase II.

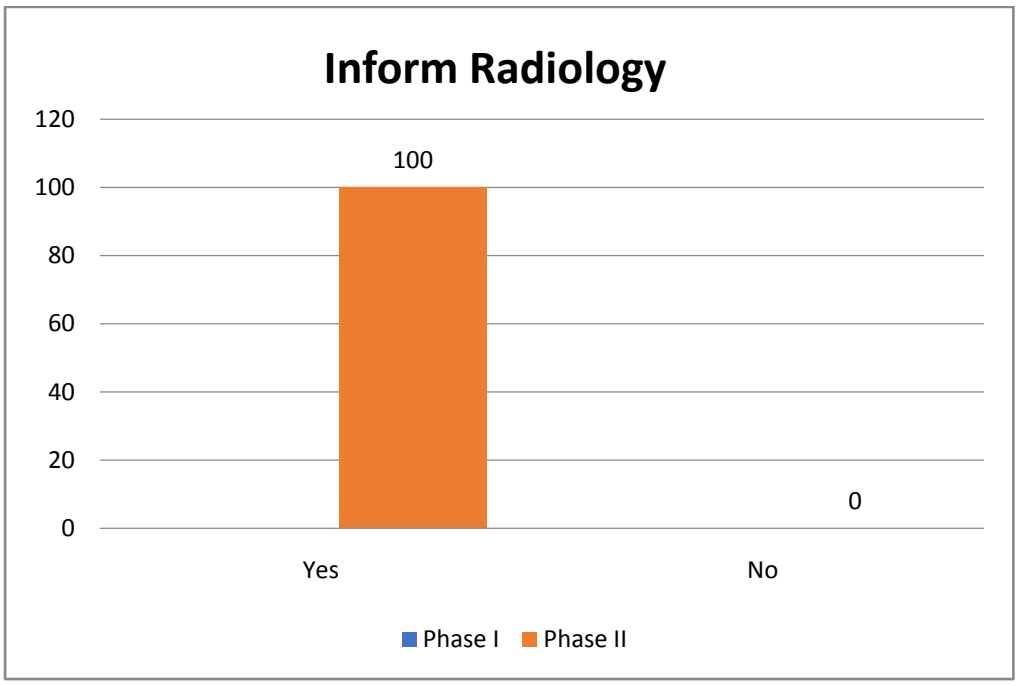
Table 24: Procedure checklist 2

	Phase I	Phase II	P Value
Inform Radiology			
Yes	0 (0.00)	71 (100.0)	0.000
No	0 (0.00)	0 (0.00)	
Total	0 (00.0)	71 (100.0)	
Assess, Cleanse The Site			
Yes	0 (0.00)	71 (100.0)	0.000
No	0 (0.00)	0 (0.00)	
Total	0 (00.0)	71 (100.0)	
Position Patient Correctly For Procedure			
Yes	0 (0.00)	71 (100.0)	0.000
No	0 (0.00)	0 (0.00)	
Total	0 (00.0)	71 (100.0)	
Wear Sterile Gown And Gloves			
Yes	0 (0.00)	71 (100.0)	0.000
No	0 (0.00)	0 (0.00)	
Total	0 (00.0)	71 (100.0)	
Drape A Large Area Exposing ONLY Site			
Yes	0 (0.00)	71 (100.0)	0.000
No	0 (0.00)	0 (0.00)	
Total	0 (00.0)	71 (100.0)	
Prepare Site With 2% Chlorhexidine/4% Alcohol Solution			
Yes	0 (0.00)	71 (100.0)	0.000
No	0 (0.00)	0 (0.00)	
Total	0 (00.0)	71 (100.0)	
Prepare Site For 30 Seconds			
Yes	0 (0.00)	70 (98.6)	0.001
No	0 (0.00)	1 (1.4)	
Total	0 (00.0)	71 (100.0)	

Dry For Up To 60 Seconds Without Fanning/Wiping			
Yes	0 (0.00)	71 (100.0)	0.000
No	0 (0.00)	0 (0.00)	
Total	0 (00.0)	71 (100.0)	
Maintain Sterile Field Throughout Procedure			
Yes	0 (0.00)	67(94.4)	0.001
No	0 (0.00)	4(5.6)	
Total	0 (00.0)	71 (100.0)	
Done After Reminder			
Yes	0 (0.00)	4(5.6)	0.001
No	0 (0.00)	67(94.4)	
Total	0 (00.0)	71 (100.0)	
Did the assistant follow the same precautions? (Hand washing, mask, gloves and gown)			
Yes	0 (0.00)	67(94.4)	0.001
No	0 (0.00)	4(5.6)	
Total	0 (00.0)	71 (100.0)	
Done After Reminder (Hand Washing, Mask, Gloves And Gown)			
Yes	0 (0.00)	4(5.60	
No	0 (0.00)	67(94.4)	
Total	0 (00.0)	71 (100.0)	
Was Sterility Maintained When Applying Dressing/ Stitches?			
Yes	0 (0.00)	71 (100.0)	0.000
No	0 (0.00)	0 (0.00)	
Total	0 (00.0)	71 (100.0)	
Was Sterile Field Compromised During Line Readjustment?			
Yes	0 (0.00)	10 (14.1)	0.02
No	0 (0.00)	61(85.9)	
Total	0 (00.0)	71 (100.0)	
Done After Reminder Sterile Field			
Yes	0 (0.00)	10 (14.1)	0.00
No	0 (0.00)	61(85.9)	

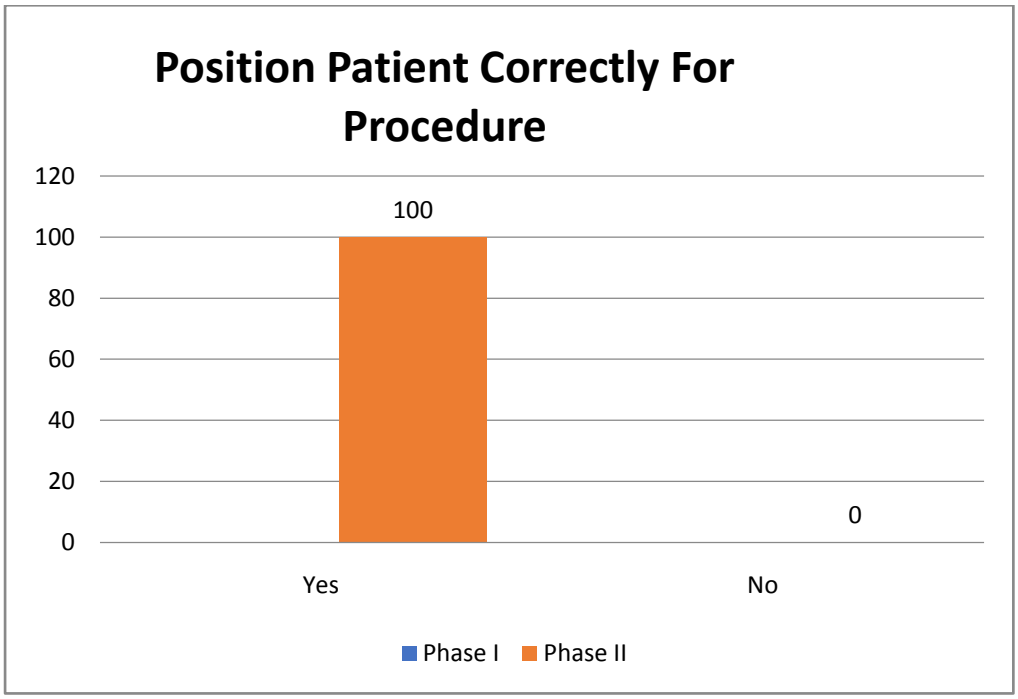
Were IV fluids/lines being attached aseptically like scrubbing the hub for 30 sec?			
Yes	0 (0.00)	71 (100.0)	0.00
No	0 (0.00)	0 (0.00)	
Is the umbilical line dressing changed routinely?			
Yes	0 (0.00)	71 (100.0)	0.00
No	0 (0.00)	0 (0.00)	

Figure 49: Inform Radiology



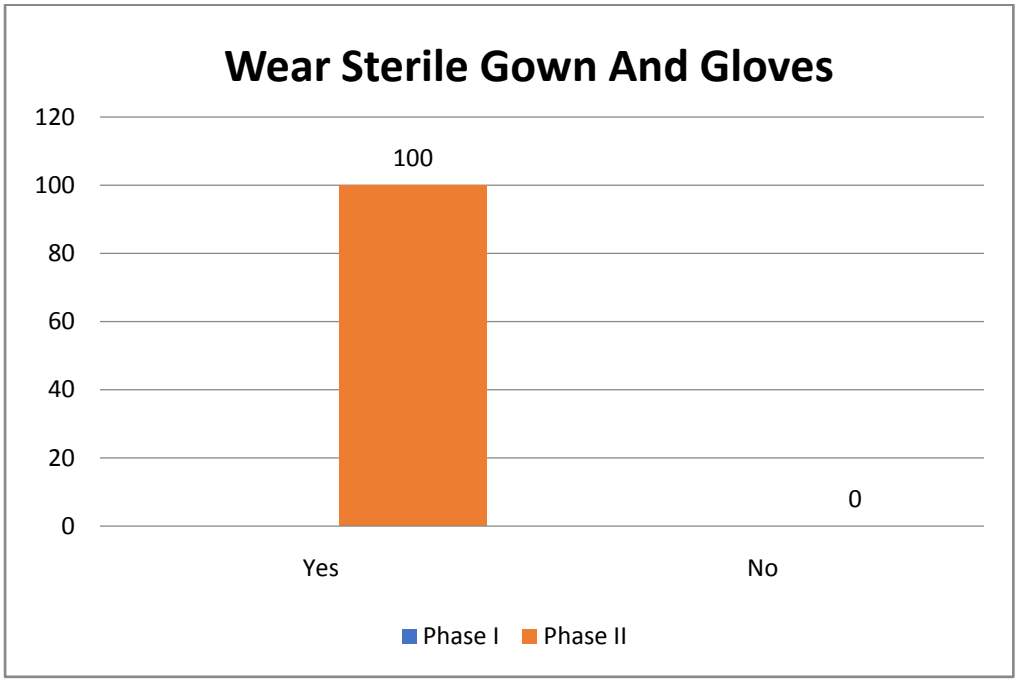
From the above table and graph it was observed that inform radiology was used for 100% subjects of phase II.

Figure 50: Position Patient Correctly For Procedure



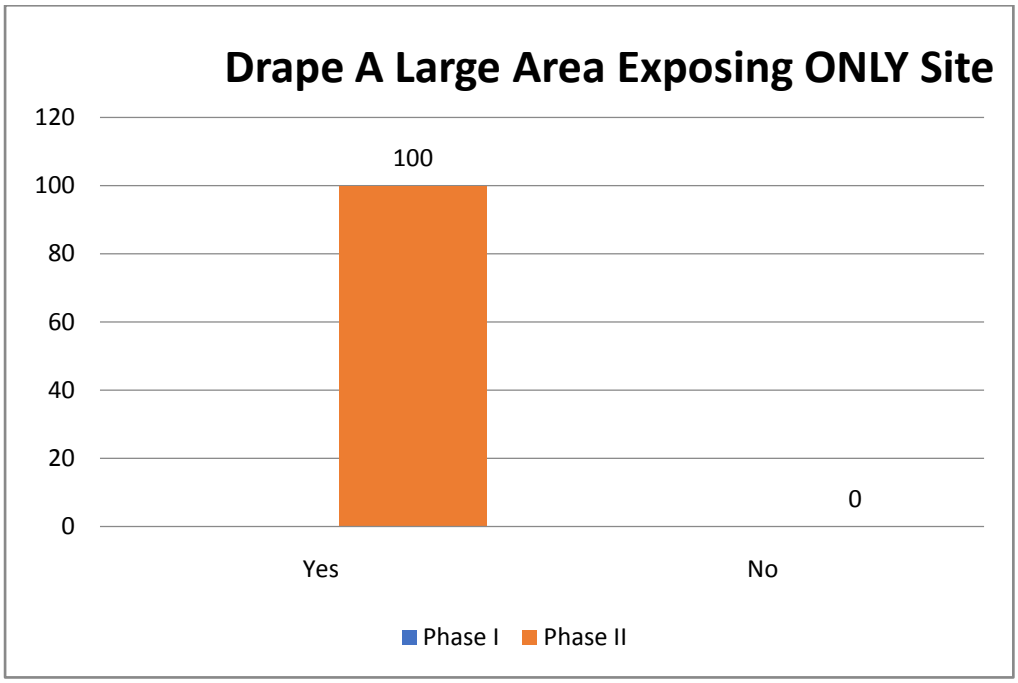
From the above table and graph it was observed that assess, cleanse the site was performed for 100% subjects of phase II.

Figure 51: Wear Sterile Gown And Gloves



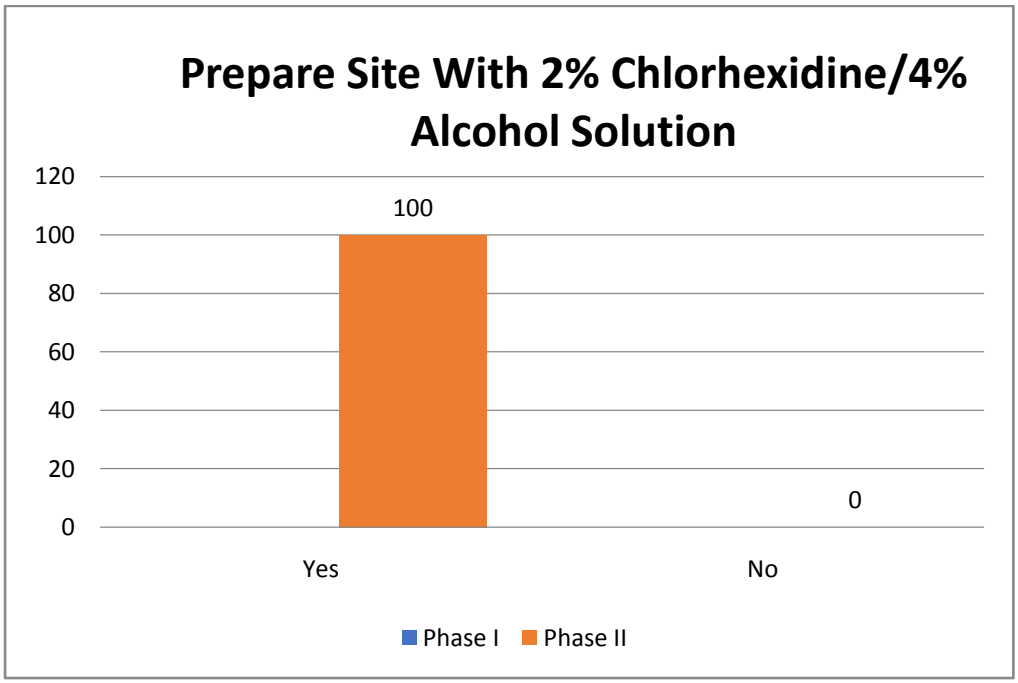
From the above table and graph it was observed that sterile gown and cloves was used for 100% subjects of phase II.

Figure 52: Drape A Large Area Exposing ONLY Site



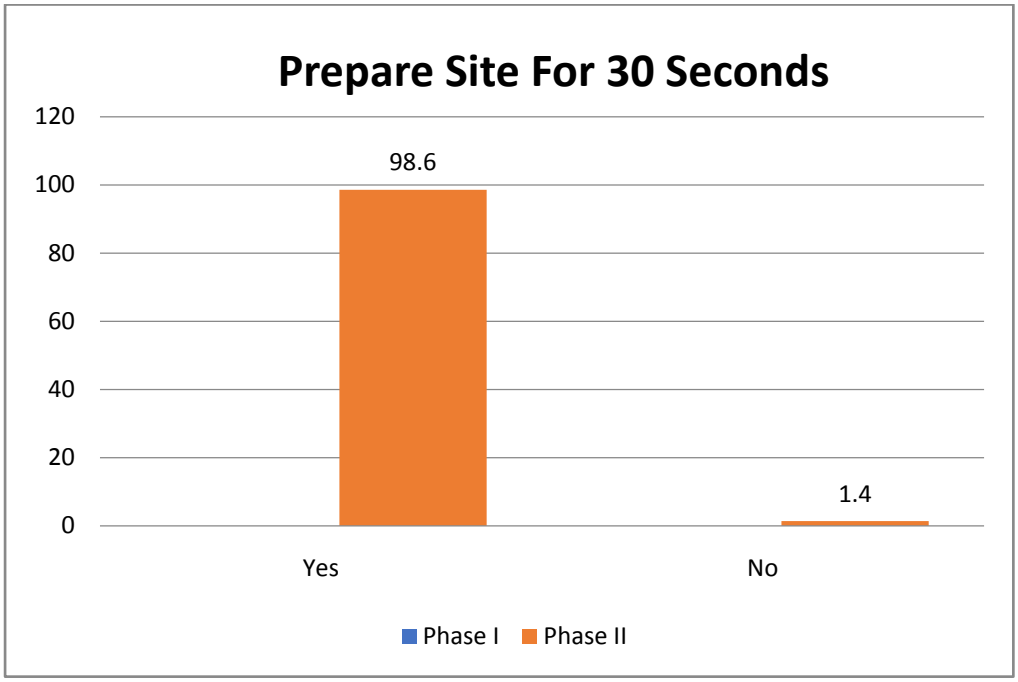
From the above table and graph it was observed that a large area exposing only site was draped for 100% subjects of phase II.

Figure 53: Prepare Site With 2% Chlorhexidine/4% Alcohol Solution



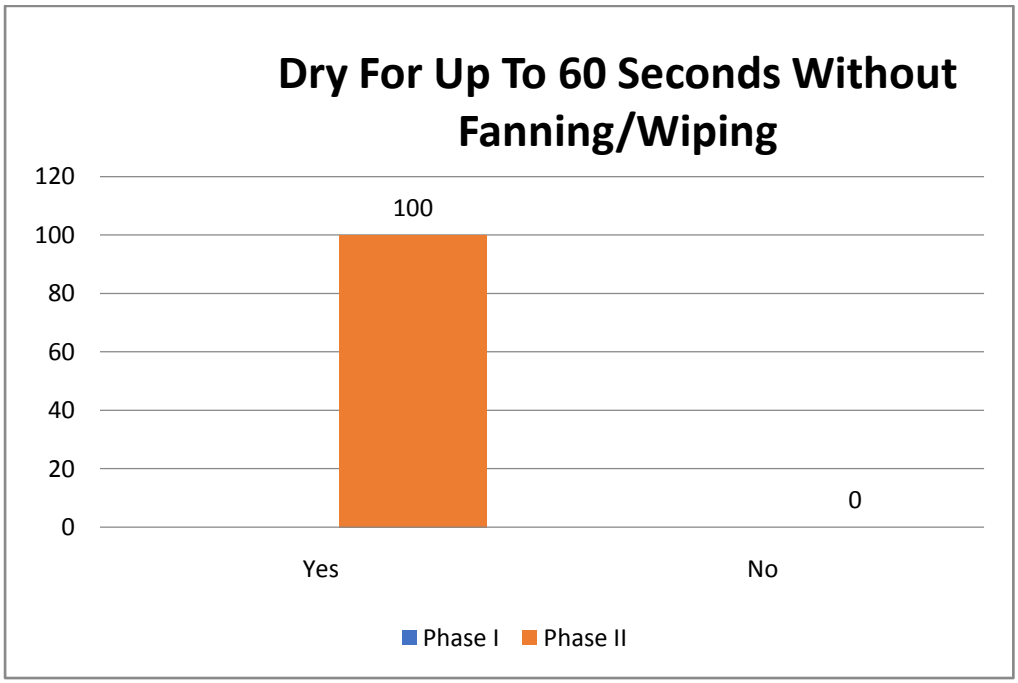
From the above table and graph it was observed that site was prepared with 2% chlorhexidine/4% alcohol solution for 100% subjects of phase II.

Figure 54: Prepare Site For 30 Seconds



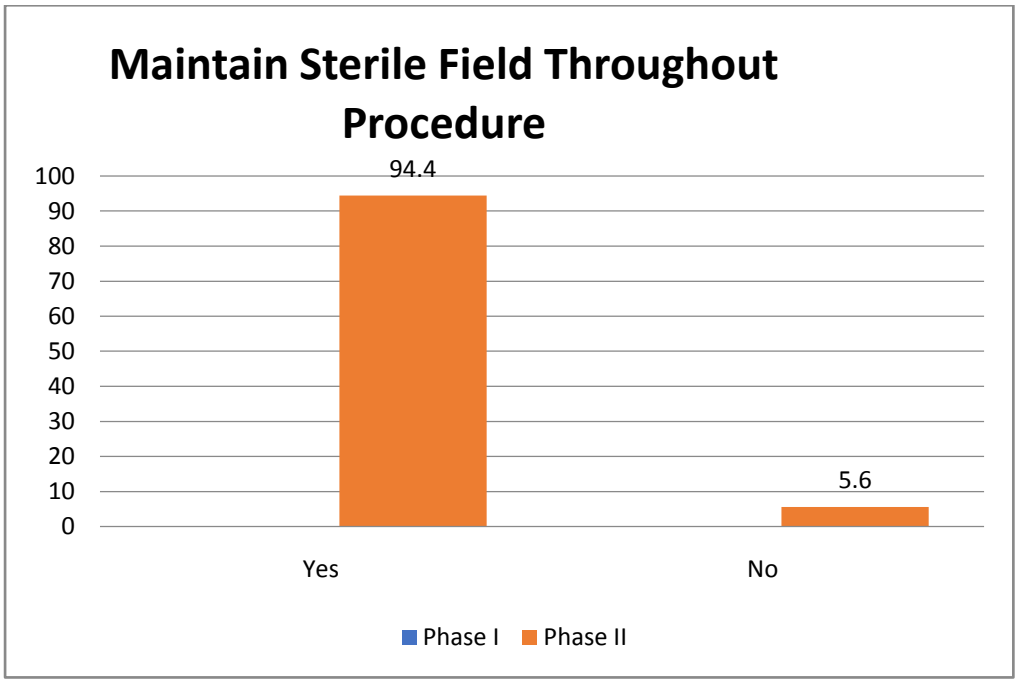
From the above table and graph it was observed that site was prepared for 30 seconds in 98.6% subjects of phase II.

Figure 55: Dry For Up To 60 Seconds Without Fanning/Wiping



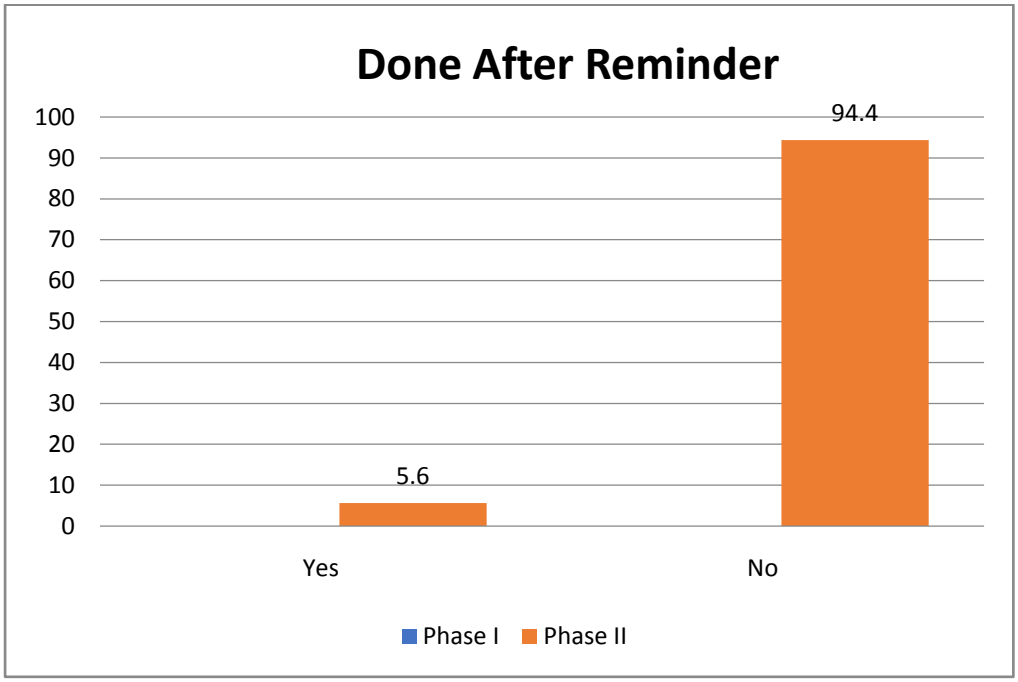
From the above table and graph it was observed that site was dried for up to 60 seconds without fanning/wiping for 100% subjects of phase II.

Figure 56: Maintain Sterile Field Throughout Procedure



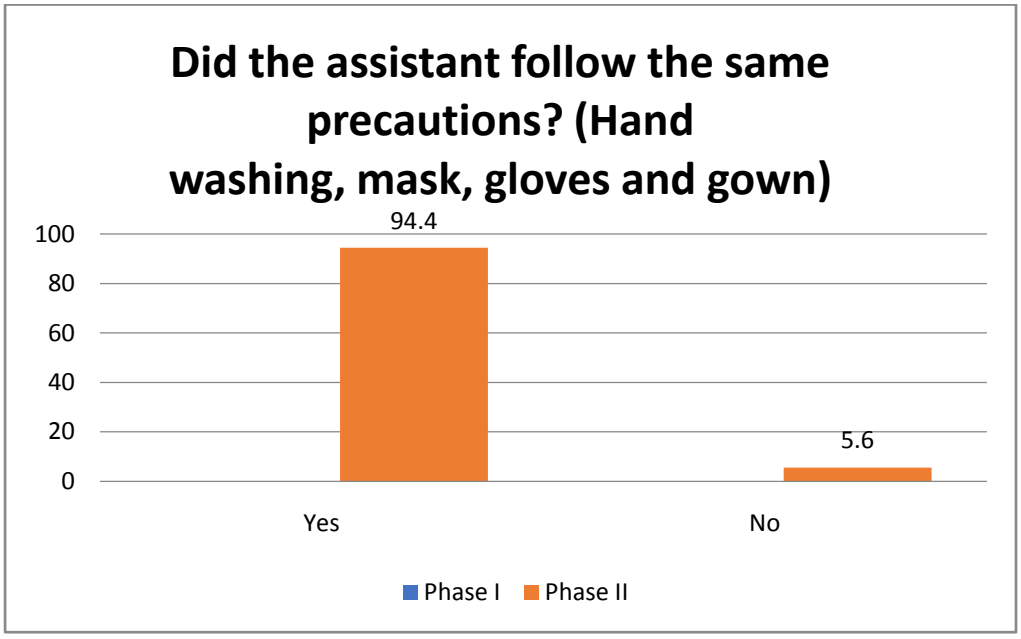
From the above table and graph it was observed that sterile field throughout procedure was maintained for 94.4% subjects of phase II.

Figure 57: Done After Reminder



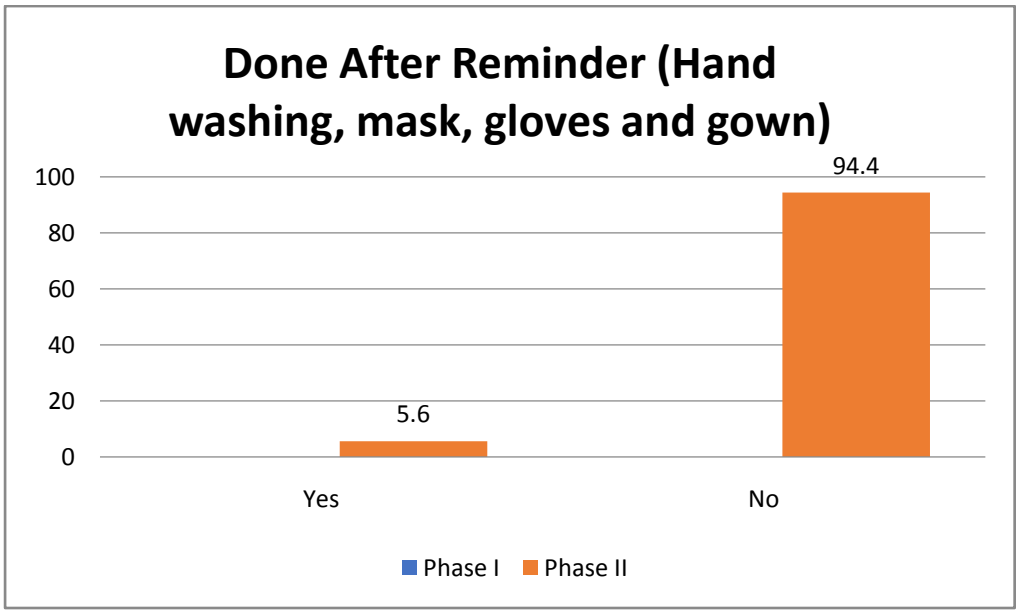
From the above table and graph it was observed that sterile field throughout procedure was maintained for 5.6% subjects of phase II after reminder.

Figure 58: Did the assistant follow the same precautions? (Hand washing, mask, gloves and gown)



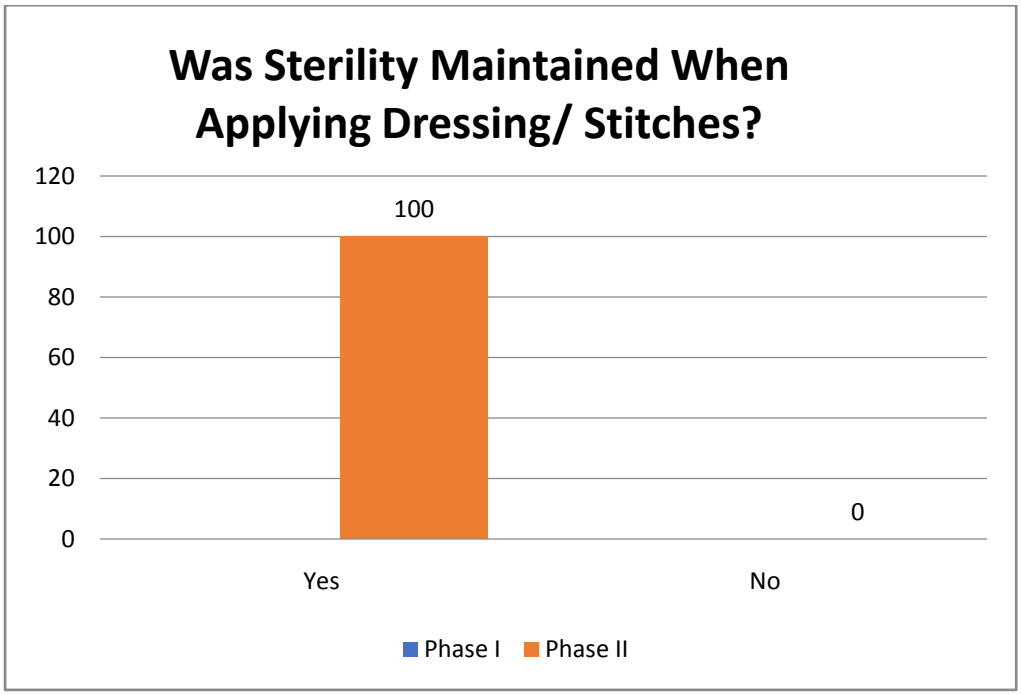
From the above table and graph it was observed that assistant has followed the same precautions for 94.4% subjects of phase II.

Figure 59: Done After Reminder (Hand washing, mask, gloves and gown)



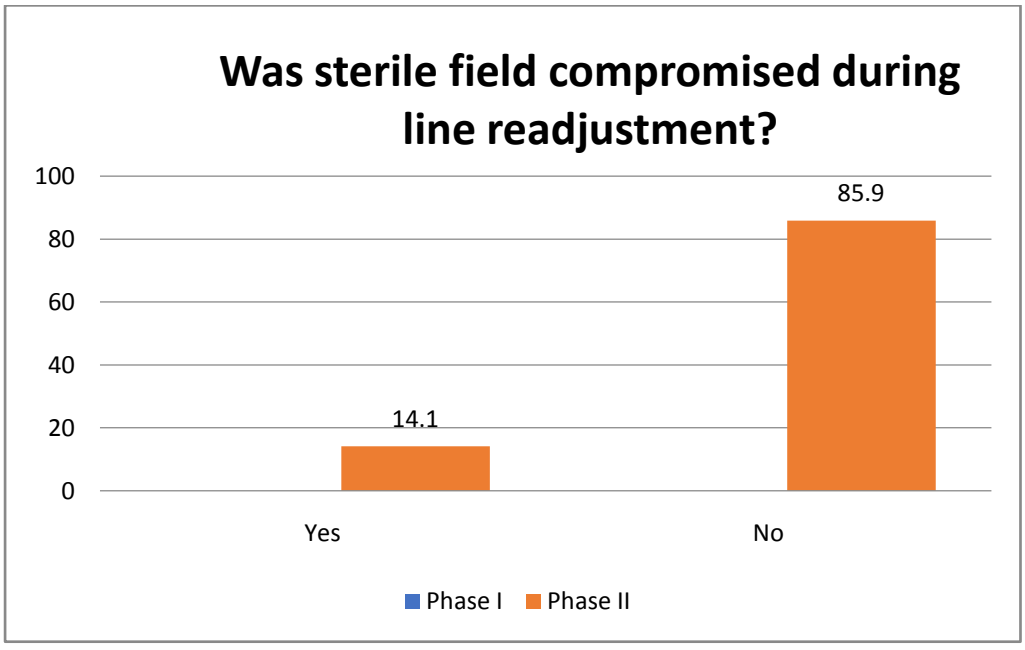
From the above table and graph it was observed that assistant has followed the same precautions for 5.6% subjects of phase II after reminder.

Figure 60: Was Sterility Maintained When Applying Dressing/ Stitches?



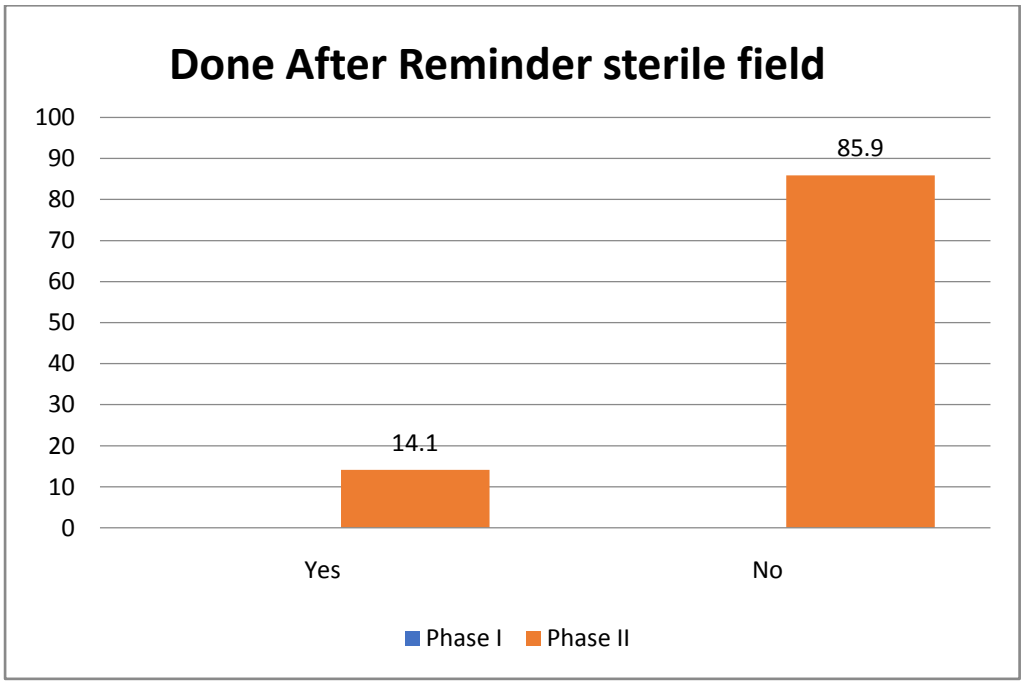
From the above table and graph it was observed that sterility maintained when applying dressing/ stitches for 100% subjects of phase II.

Figure 61: Was sterile field compromised during line readjustment?



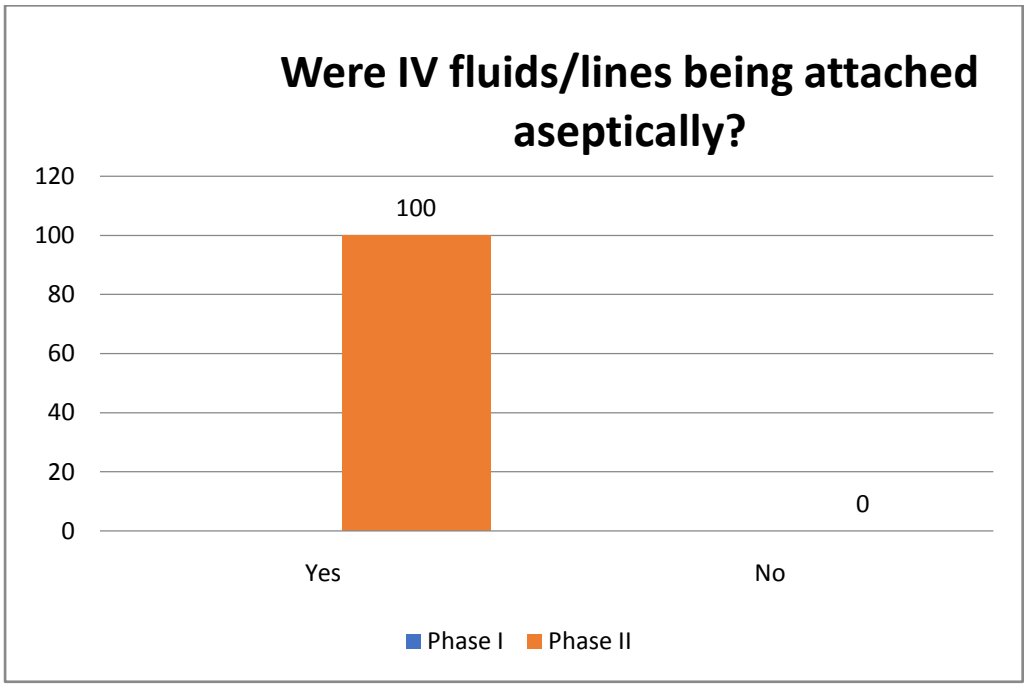
From the above table and graph it was observed that Sterile Field Compromised During Line Readjustment for 14.1% subjects of phase II.

Figure 62: Done After Reminder sterile field



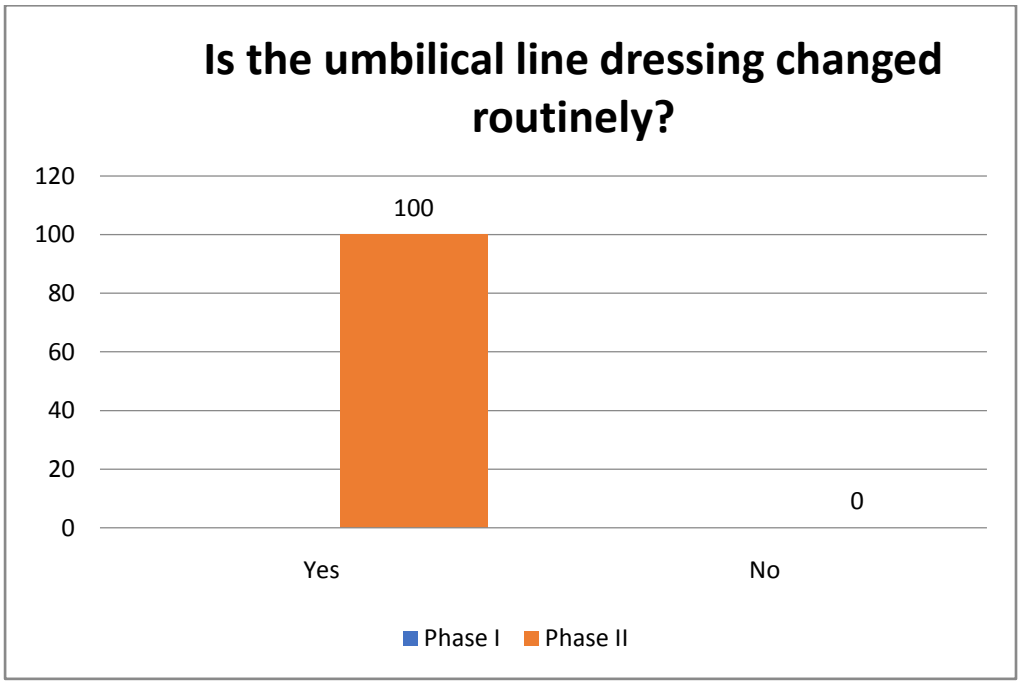
From the above table and graph it was observed that Sterility was done after reminder for 14.1% subjects of phase II.

Figure 63: Were IV fluids/lines being attached aseptically?



From the above table and graph it was observed that IV fluids/lines being attached aseptically for 100% subjects of phase II.

Figure 64: Is the umbilical line dressing changed routinely?

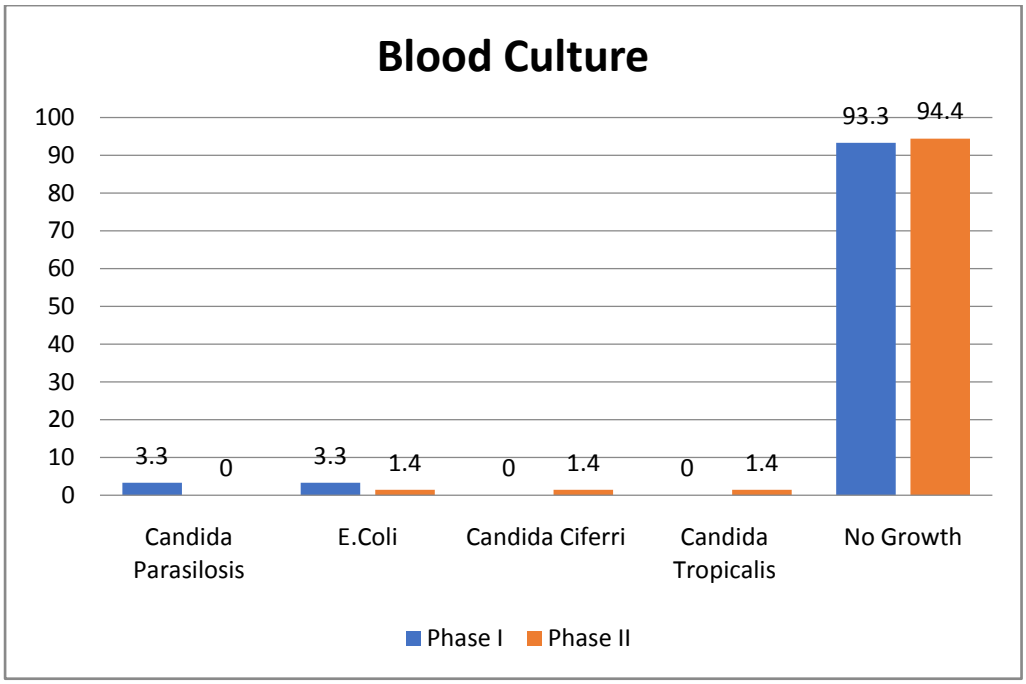


From the above table and graph it was observed that umbilical line dressing was changed routinely for 100% subjects of phase II.

Table 25: Blood culture

Blood Culture			
	Phase I	**Phase II**	**P Value**
Candida parasilosis	1 (3.3)	0 (0.00)	0.15
Escherichia coli	1 (3.3)	1 (1.4)	
Candida ciferri	0 (0.00)	1 (1.4)	
Candida tropicalis	0 (0.00)	1 (1.4)	
No Growth	28 (93.3)	67 (94.4)	
Total	30 (100.0)	71 (100.0)	

Figure 65: Blood Culture



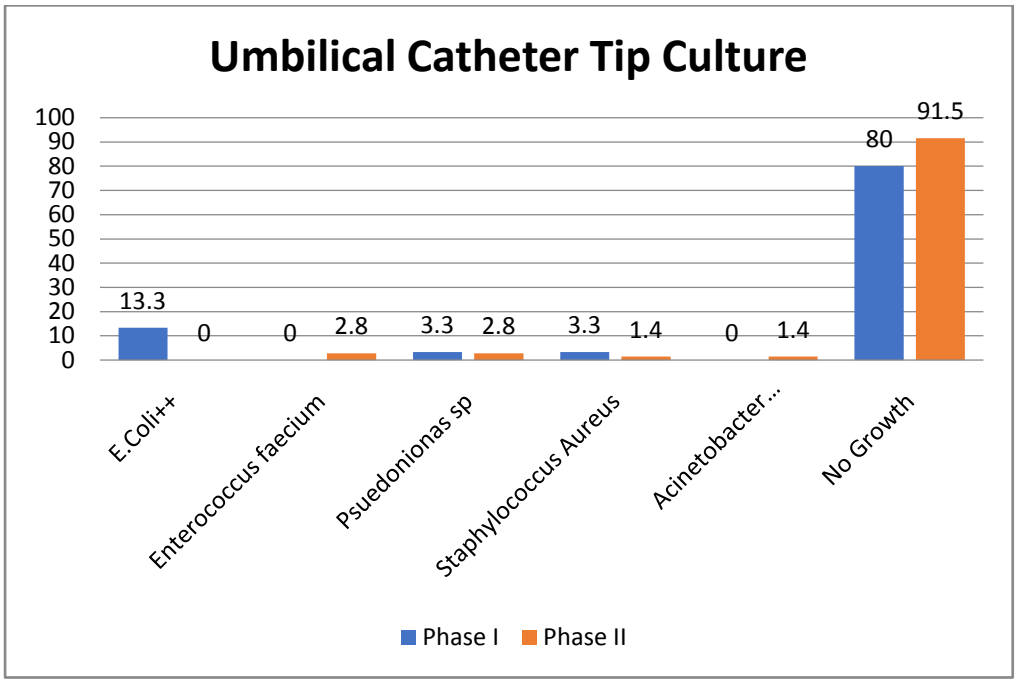
From the above table and graph it was observed that in blood culture E.coli (3.3%) and Candida parasilosis (3.3%) growth was reported in majority of subjects of phase I while no growth was reported in 93.3% subjects.

The study found out that in phase II there were 94.4% subjects whose blood culture has shown no growth, while E.coli (1.4%), Candida Ciferri (1.4%), and Candida Tropicalis (1.4%) was the most common reported growth.

Table 26: Umbilical Catheter Tip Culture

Umbilical Catheter Tip Culture			
	Phase I	**Phase II**	**P Value**
Escherichia coli	4 (13.3)	0 (0.00)	0.21
Psuedomonas sp.	1 (3.3)	2 (2.8)	
Staphylococcus aureus	1 (3.3)	1 (1.4)	
Acinetobacter baumanii	0 (0.00)	1 (1.4)	
Enterococcus feacium	0 (0.00)	2 (2.8)	
No Growth	24 (80.0)	65 (91.5)	
Total	30 (100.0)	71 (100.0)	

Figure 66: Umbilical Catheter Tip Culture



From the above table and graph it was observed that Umbilical Catheter Tip Culture has shown no growth in majority of subjects in both phase I (80%) and phase II (91.5%) subjects. E.coli++ growth was reported in 13.3% subjects of phase I.

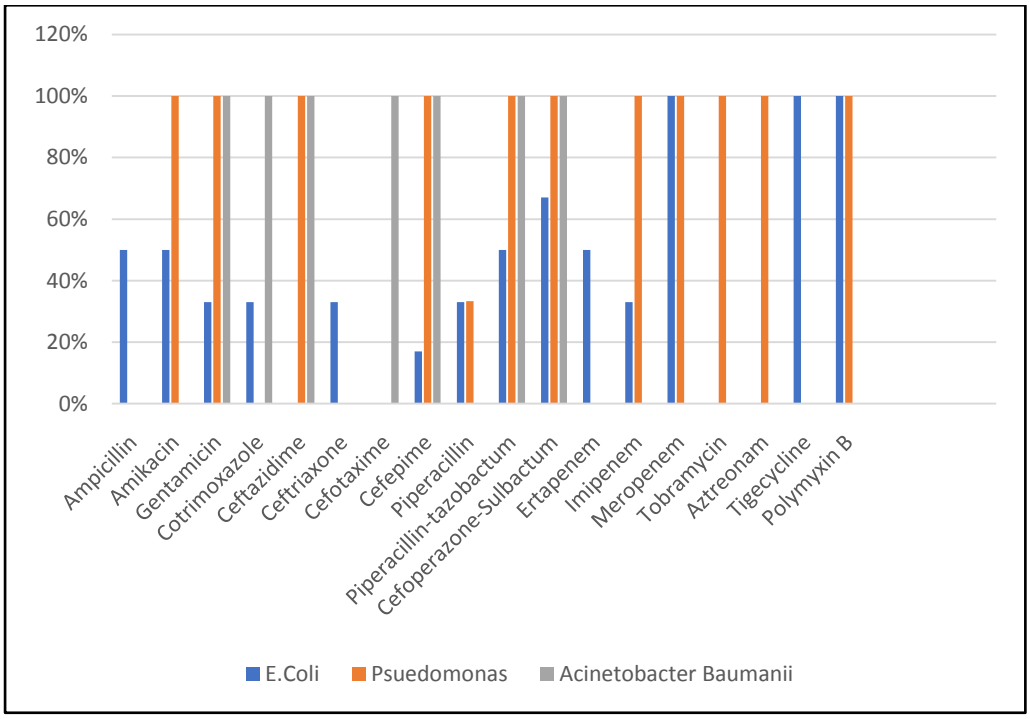
Table 27: Antimicrobial susceptibility profile of gram negative bacteria

Numerator:- drugs sensitive

Denominator:- No. of cultures tested for the drug

Drugs	*E.coli* (n=6)	*Pseudomonas* (n=3)	*Acinetobacter baumannii*(n=1)
Ampicillin	3/6 (50%)	--	--
Amikacin	3/6 (50%)	3/3 (100%)	0/1 (0%)
Gentamicin	2/6 (33.3%)	3/3 (100%)	1/1 (100%)
Cotrimoxazole	2/6 (33.3%)	--	1/1 (100%)
Ceftazidime	--	3/3 (100%)	1/1 (100%)
Ceftriaxone	2/6 (33%)	--	0/1 (0%)
Cefotaxime	0/6 (0%)	--	1/1 (100%)
Cefepime	1/ 6 (16.6%)	3/3 (100%)	1/1 (100%)
Piperacillin	2/6 (33.3%)	1/3 (33.3%)	--
Piperacillin-tazobactum	3/6 (50%)	3/3 (100%)	1/1 (100%)
Cefoperazone-Sulbactum	4/6 (66.7%)	3/3 (100%)	1/1 (100%)
Ertapenem	3/6 (50%)	--	--
Imipenem	2/6 (33.3 %)	3/3 (100%)	--
Meropenem	6/6 (100%)	3/3 (100%)	--
Tobramycin	0/6 (0%)	3/3 (100%)	--
Aztreonam	0/6 (0%)	3/3 (100%)	--
Tigecycline	6/6 (100%)	--	--
Polymyxin B	6/6 (100%)	3/3 (100%)	--

Figure 67: Antimicrobial susceptibility profile of gram negative bacteria



In this table and graph, it was observed that

E.coli showed 100% sensitivity to Polymixin B, Tigecycline, Meropenem followed by 66.7% sensitivity to Cefoperazone + sulbactam followed by 50% sensitivity shown to Amikacin, Ertapenem, Pipercilliin +Tazobactam, Ampicillin.

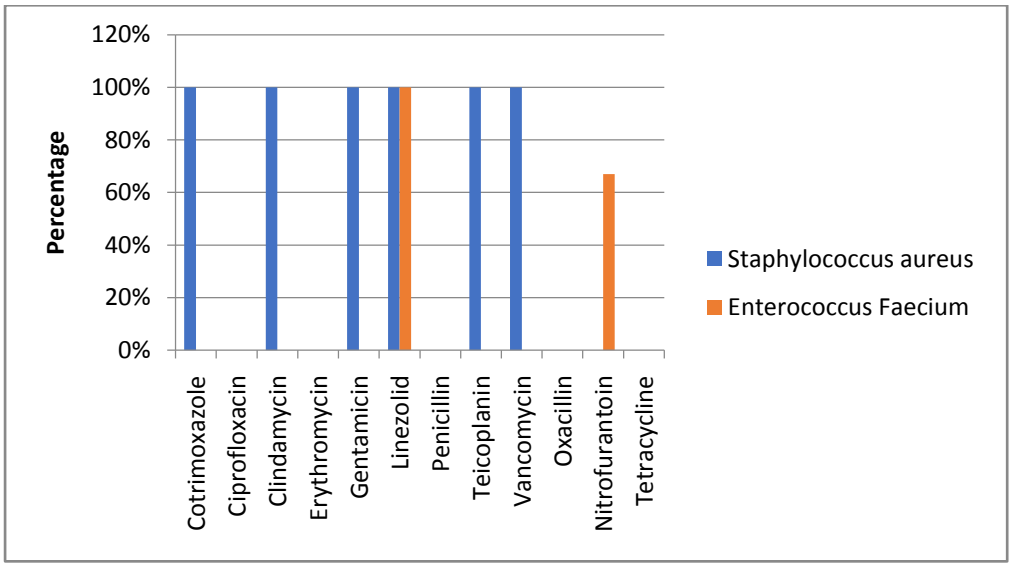
Psuedomonas showed 100% sensitivity to Polymixin B, Aztreonam, Imipenem, Tobramycin, Gentamicin, Amikacin, Imipenem, Meropenem, Piperacilliin +Tazobactam, Cefoperazone + Sulbactam, Cefepime and Ceftazidime followed by 33.3% senstivity to Piperacillin alone.

Acinetobacter baumanii is 100% sensitive to Cefotaxime, Cefoperazone + sulbactam, Ceftazidime, Cefipime, Gentamicin, Piperacillin + Tazobactam and Cotrimoxazole but resistant to Ceftriaxone and amikacin.

Table 28: Antimicrobial susceptibility profile of gram positive bacteria

Drugs	*Staphylococcus aureus* (n=2)	*Enterococcus faecium* (n=3)
Penicillin	0/2 (0%)	0/3 (0%)
Oxacillin	0/2 (0%)	--
Ciprofloxacin	0/2 (0%)	0/3 (0%)
Gentamicin	2/2 (100%)	0/3 (0%)
Cotrimoxazole	2/2 (100%)	--
Clindamycin	2/2 (100%)	--
Erythromycin	0/2 (0%)	0/3 (0%)
Vancomycin	2/2 (100%)	0/3 (0%)
Teicoplanin	2/2 (100%)	0/3 (0%)
Linezolid	2/2 (100%)	3/3 (100%)
Nitrofurantoin	--	2/3 (66.6 %)
Tetracycline	--	0/3 (0%)

Figure 68: Antimicrobial susceptibility profile of gram positive bacteria



In this table and graph, it was seen that

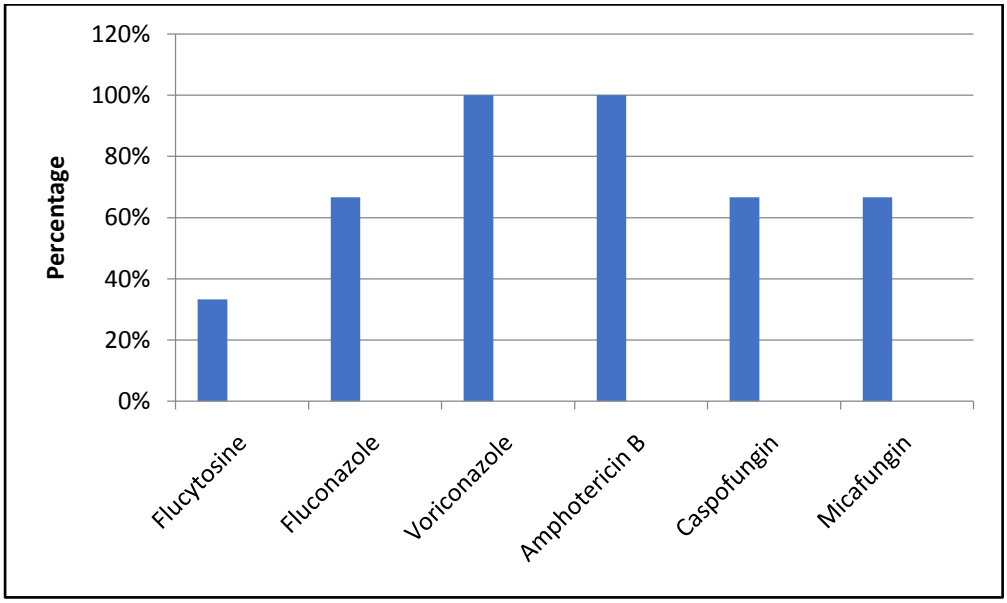
Enterococcus faecium is 100% sensitive to Linezolid and 66.6% to Nitrofurantoin but resistant to Ciprofloxacin, Erythromycin, Penicillin, Teicoplanin, Tetracycline, Vancomycin and Gentamicin (High).

Staphylococcus aureus is 100% sensitive to Cotrimoxazole, Clindamycin, Gentamicin, Linezolid, Teicoplanin and Vancomycin but resistant to Ciprofloxacin, Erythromycin, Penicillin and Oxacillin.

Table 29: Antifungal Susceptibility Profile of *Candida spp*.

Drugs	*Candida spp.* (3)
Flucytosine	1/3 (33.3%)
Fluconazole	2/3 (66.6%)
Voriconazole	3/3 (100%)
Amphotericin B	3/3 (100%)
Caspofungin	2/3 (66.6%)
Micafungin	2/3 (66.6%)

Figure 69: Antifungal Susceptibility Profile of Candida spp.



In this table and graph, it was observed that *Candida spp*. is 100% sensitive to Voriconazole, Amphotericin B.

Table 30: Insertion cart list

	Phase I	Phase II	P Value
TOP SHELF_Sterile Towels			
Yes	0 (0.00)	71 (100.0)	0.000
No	0 (0.00)	0 (0.00)	
Total	0 (00.0)	71 (100.0)	
Sterile Gowns			
Yes	0 (0.00)	71 (100.0)	0.000
No	0 (0.00)	0 (0.00)	
Total	0 (00.0)	71 (100.0)	
Caps (in plastic bag)			
Yes	0 (0.00)	71 (100.0)	0.000
No	0 (0.00)	0 (0.00)	
Total	0 (00.0)	71 (100.0)	
Masks			
Yes	0 (0.00)	71 (100.0)	0.000
No	0 (0.00)	0 (0.00)	
Total	0 (00.0)	71 (100.0)	
UAC Trays			
Yes	0 (0.00)	71 (100.0)	0.000
No	0 (0.00)	0 (0.00)	
Total	0 (00.0)	71 (100.0)	
BOTTOM SHELF_#6 Fr. Single Lumen Umbilical line			
Yes	0 (0.00)	71 (100.0)	0.000
No	0 (0.00)	0 (0.00)	
Total	0 (00.0)	71 (100.0)	
#5 Fr. Single Lumen Umbilical line			
Yes	0 (0.00)	70 (98.6)	0.000
No	0 (0.00)	1 (1.4)	
Total	0 (00.0)	71 (100.0)	

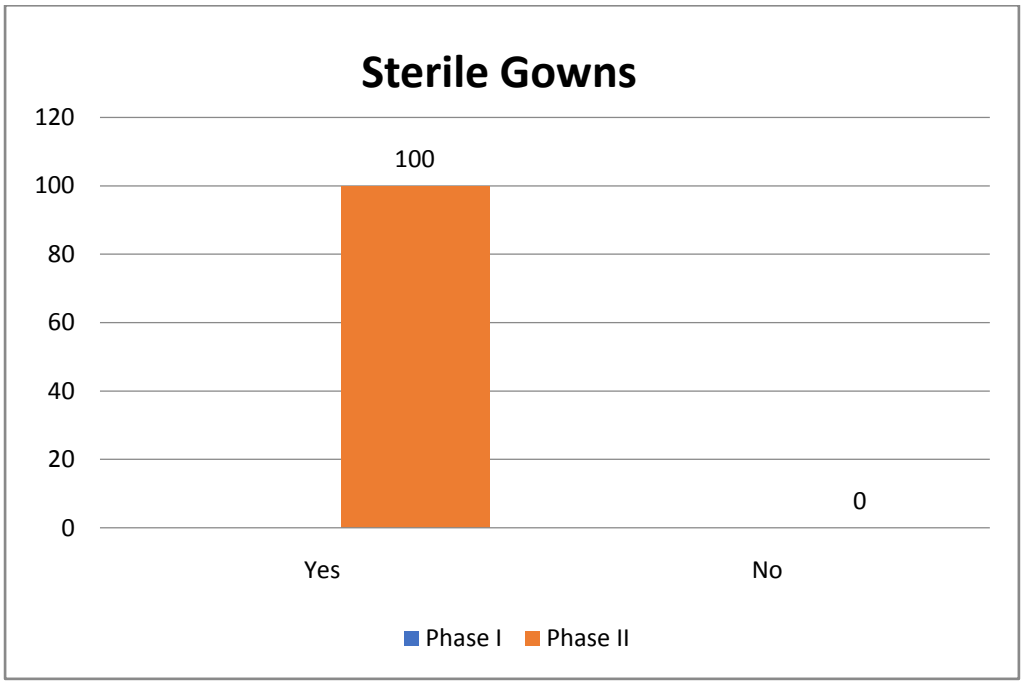
#3.5 Fr. Single Lumen Umbilical line			
Yes	0 (0.00)	71 (100.0)	0.000
No	0 (0.00)	0 (0.00)	
Total	0 (00.0)	71 (100.0)	
#3 Fr, Single Lumen Umbilical line			
Yes	0 (0.00)	71 (100.0)	0.000
No	0 (0.00)	0 (0.00)	
Total	0 (00.0)	71 (100.0)	
DRAWERS_Sterile Gloves			
Yes	0 (0.00)	71 (100.0)	0.000
No	0 (0.00)	0 (0.00)	
Total	0 (00.0)	71 (100.0)	
Measuring Tape			
Yes	0 (0.00)	71 (100.0)	0.001
No	0 (0.00)	0 (0.00)	
Total	0 (00.0)	71 (100.0)	
0.9% NaCl Vial			
Yes	0 (0.00)	71 (100.0)	
No	0 (0.00)	0 (0.00)	
Total	0 (00.0)	71 (100.0)	
0.9% NaCl Pre-filled Syringe Package			
Yes	0 (0.00)	71 (100.0)	0.000
No	0 (0.00)	0 (0.00)	
Total	0 (00.0)	71 (100.0)	
5mL Syringe			
Yes	0 (0.00)	71 (100.0)	0.02
No	0 (0.00)	0 (0.00)	
Total	0 (00.0)	71 (100.0)	
10mL Syringe			
Yes	0 (0.00)	71 (100.0)	0.00
No	0 (0.00)	0 (0.00)	

Needles (22G, 27G)			
Yes	0 (0.00)	71 (100.0)	0.00
No	0 (0.00)	0 (0.00)	
Catheter Introducer (22G, 24G)			
Yes	0 (0.00)	71 (100.0)	0.00
No	0 (0.00)	0 (0.00)	

Figure 70: TOP SHELF Sterile Towels

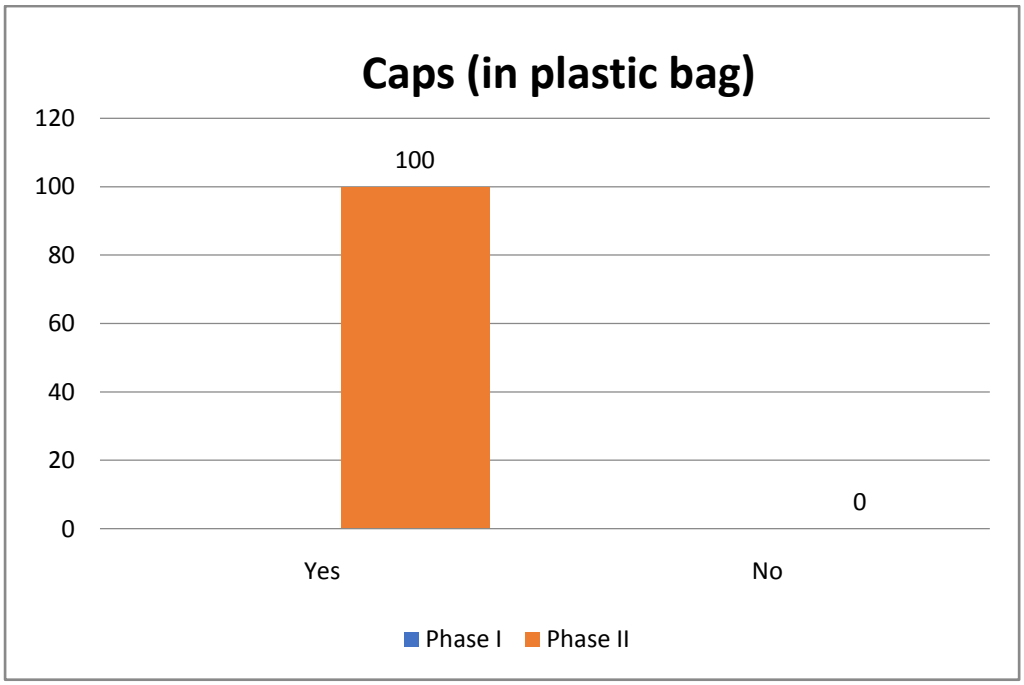
From the above table and graph it was observed that sterile towels were used for 100% subjects of phase II.

Figure 71: Sterile Gowns



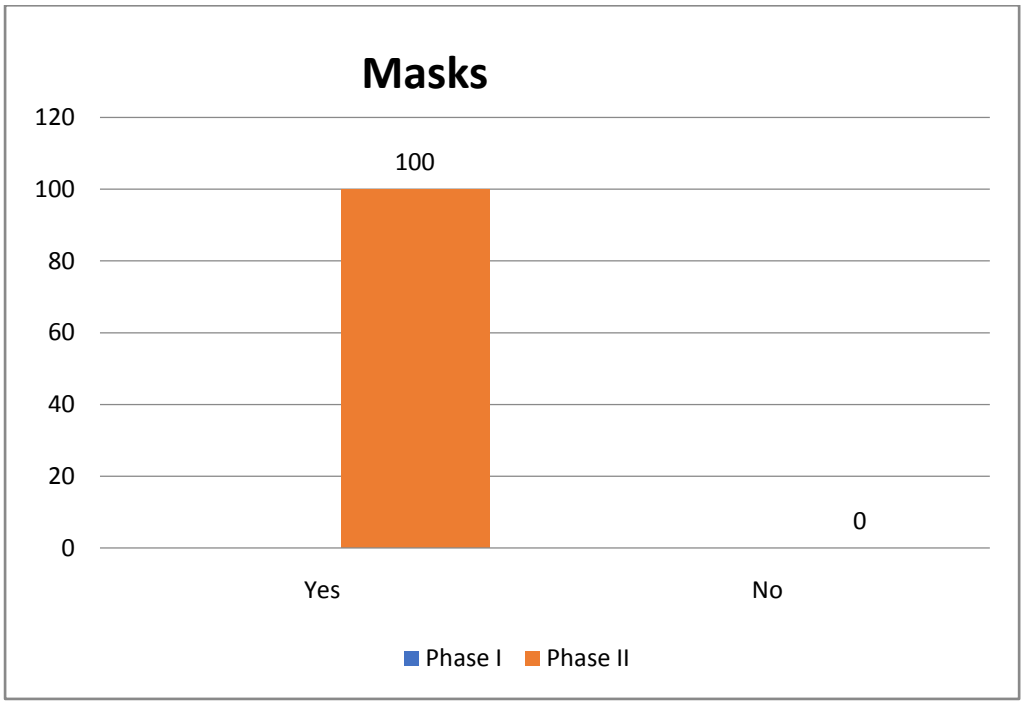
From the above table and graph it was observed that sterile gowns were used for 100% subjects of phase II.

Figure 72: Caps (in plastic bag)



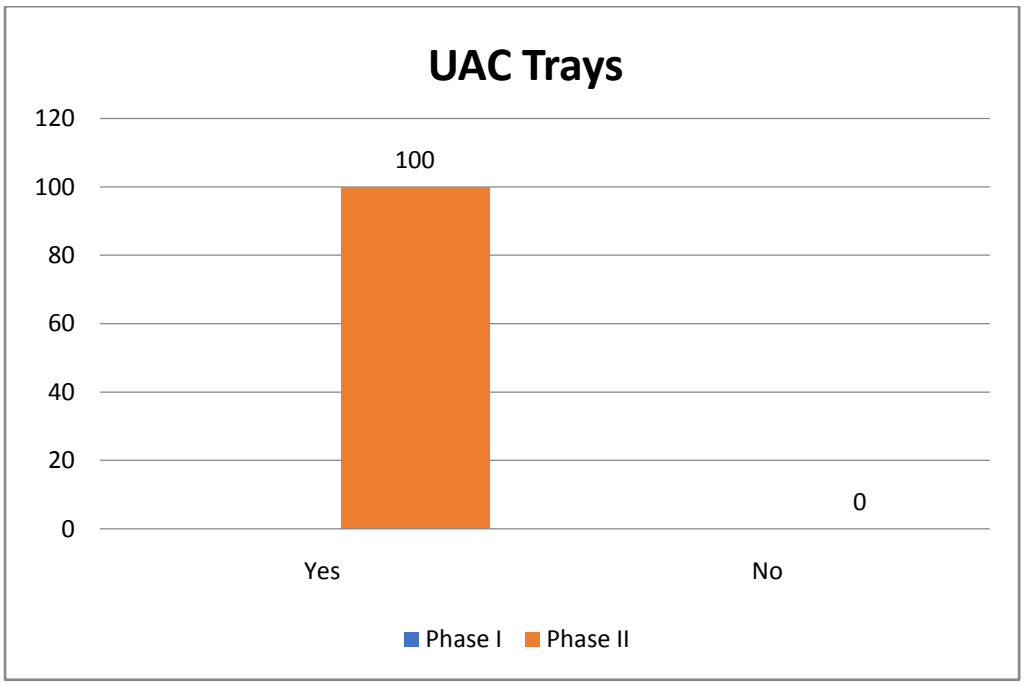
From the above table and graph it was observed that caps (in plastic bags) were used for 100% subjects of phase II.

Figure 73: Masks



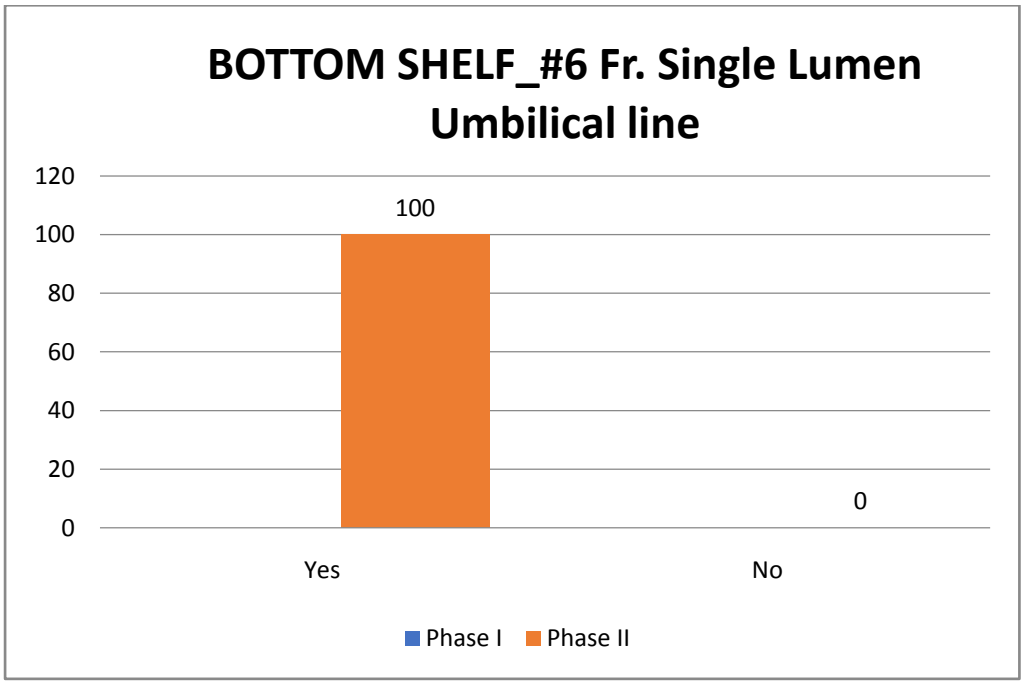
From the above table and graph it was observed that masks were used for 100% subjects of phase II.

Figure 74: UAC trays



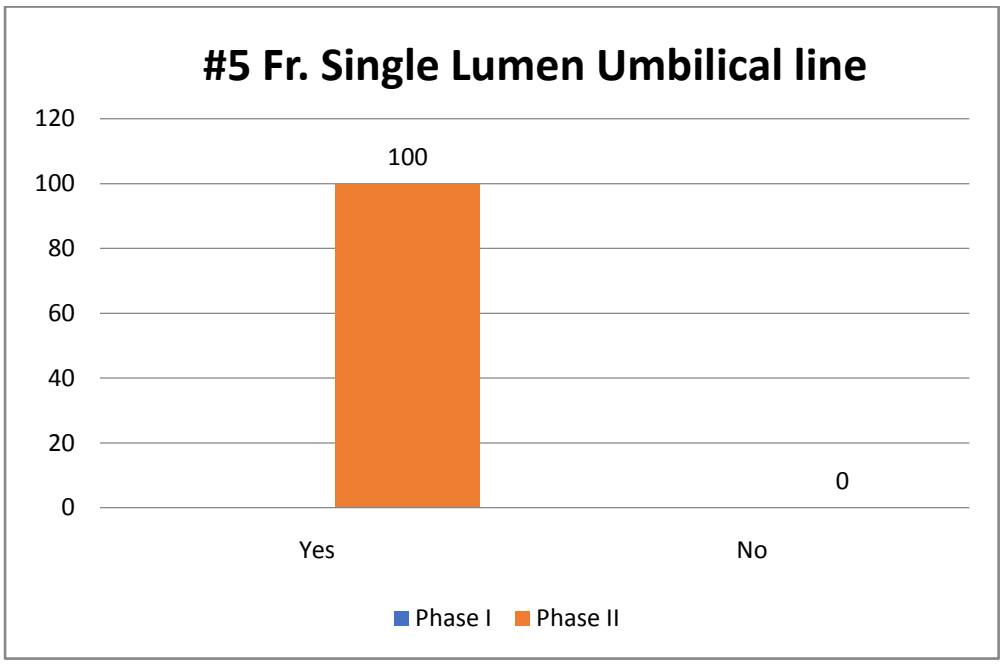
From the above table and graph it was observed that UAC trays were used for 100% subjects of phase II.

Figure 75: Bottom shelf- #6 Fr. Single Lumen Umbilical line



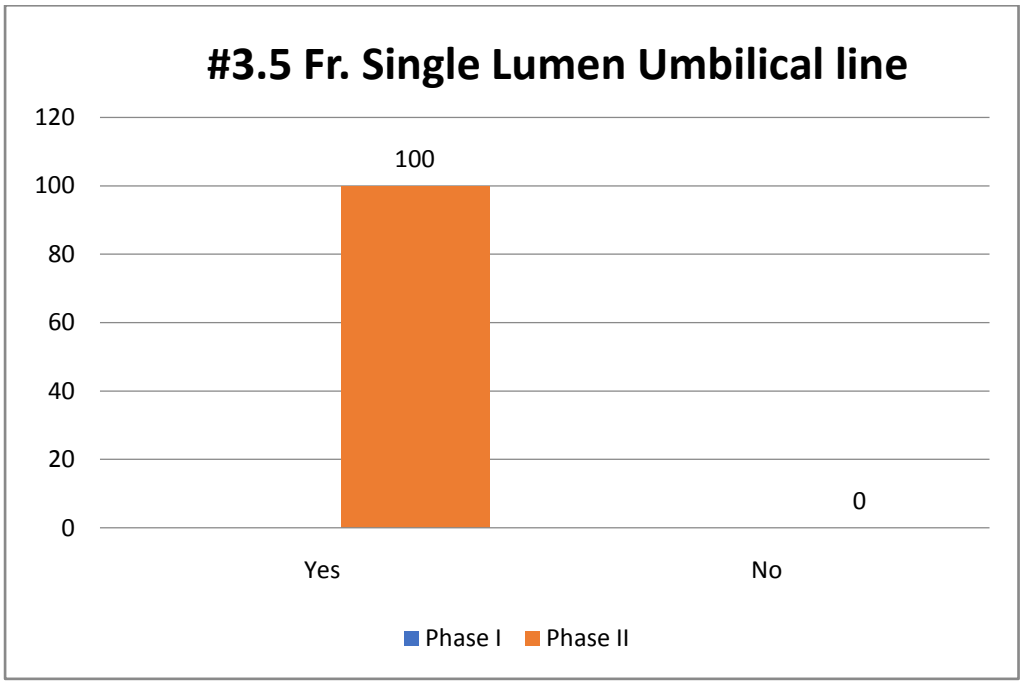
From the above table and graph it was observed that BOTTOM SHELF_#6 Fr. Single Lumen Umbilical line were used for 100% subjects of phase II.

Figure 76: #5 Fr. Single Lumen Umbilical line



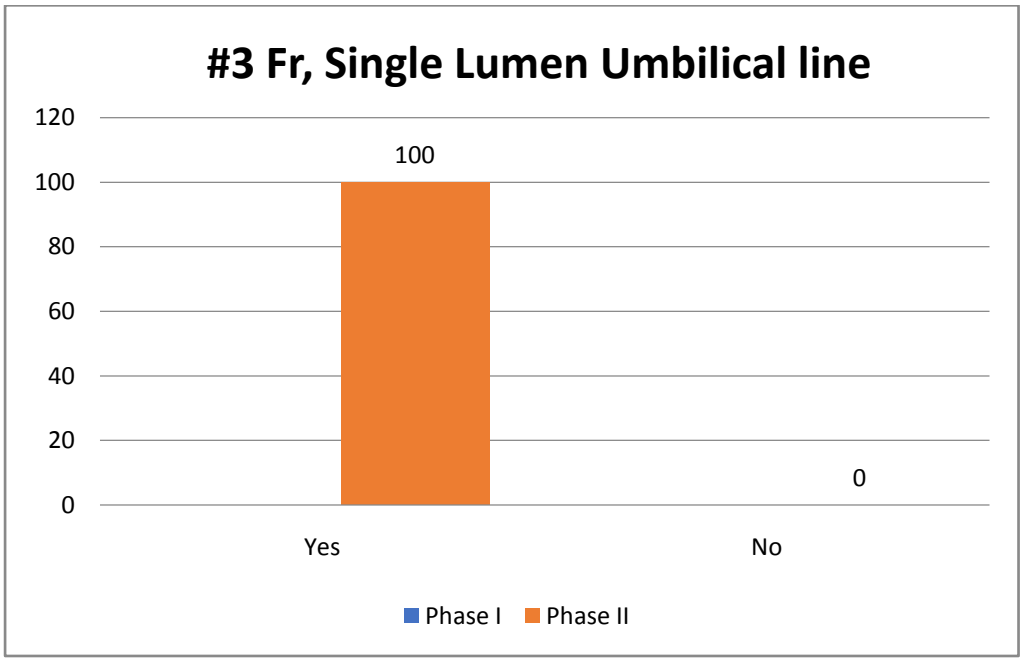
From the above table and graph it was observed that #5 Fr. Single Lumen Umbilical line were used for 98.6% subjects of phase II.

Figure 77: #3.5 Fr. Single Lumen Umbilical line



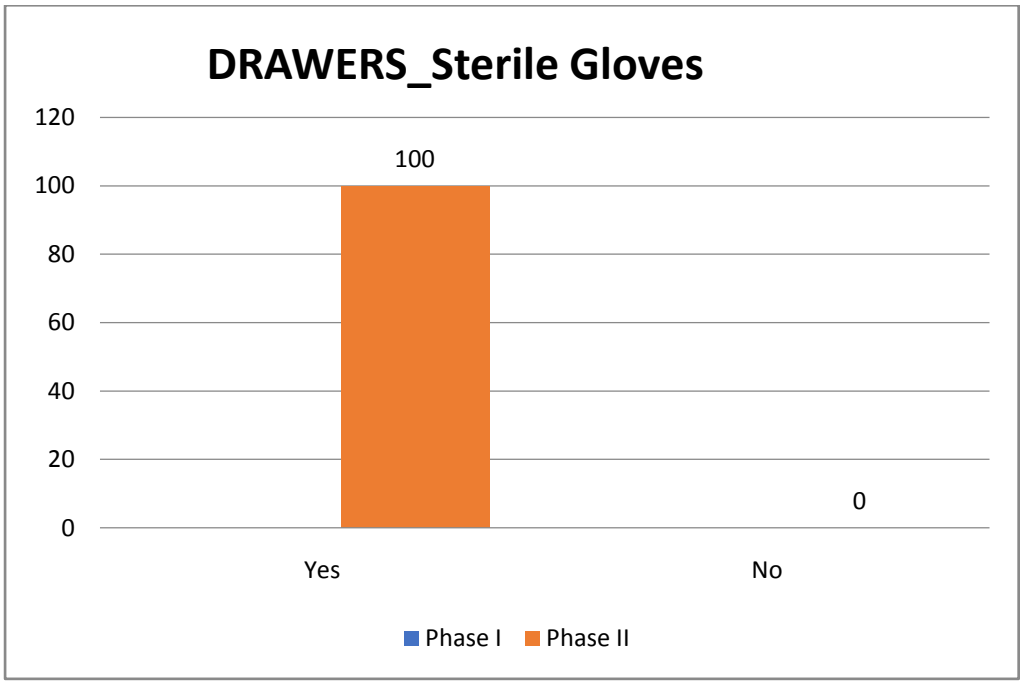
From the above table and graph it was observed that #3.5 Fr. Single Lumen Umbilical line were used for 100% subjects of phase II.

Figure 78: #3 Fr. Single Lumen Umbilical line



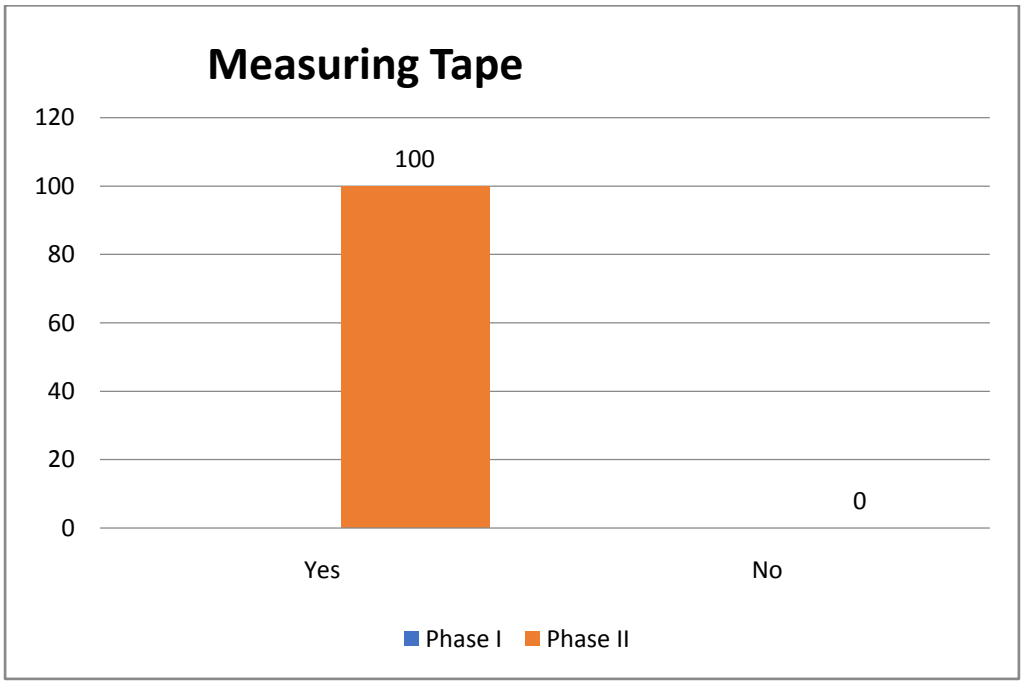
From the above table and graph it was observed that #3 Fr. Single Lumen Umbilical line were used for 100% subjects of phase II.

Figure 79: Drawers- sterile Gloves



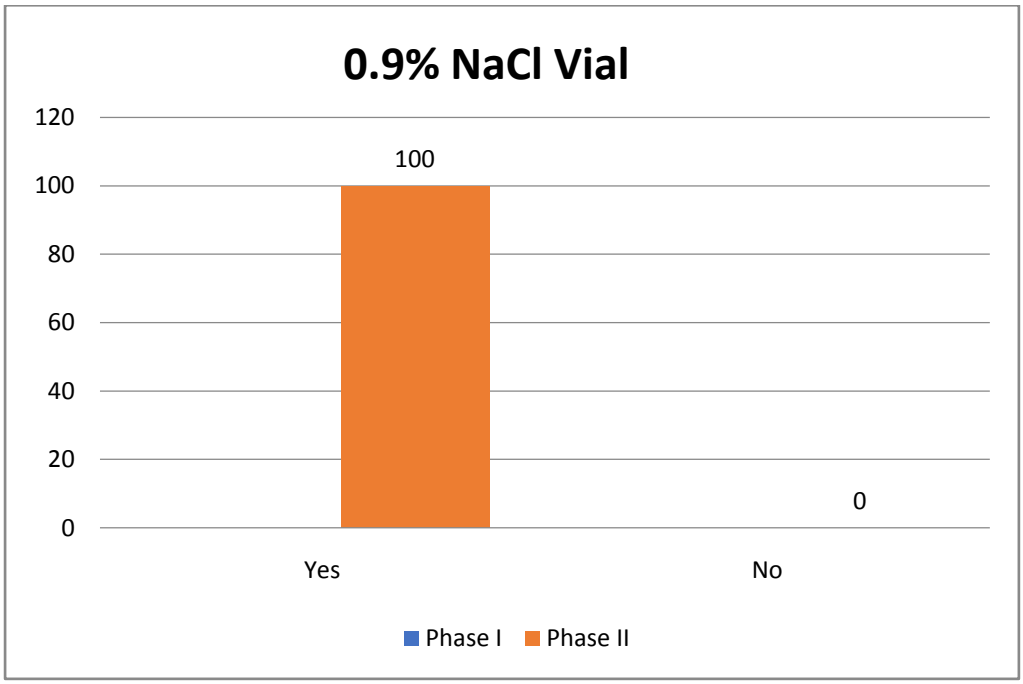
From the above table and graph it was observed that drawers sterile gloves were used for 100% subjects of phase II.

Figure 80: Measuring Tape



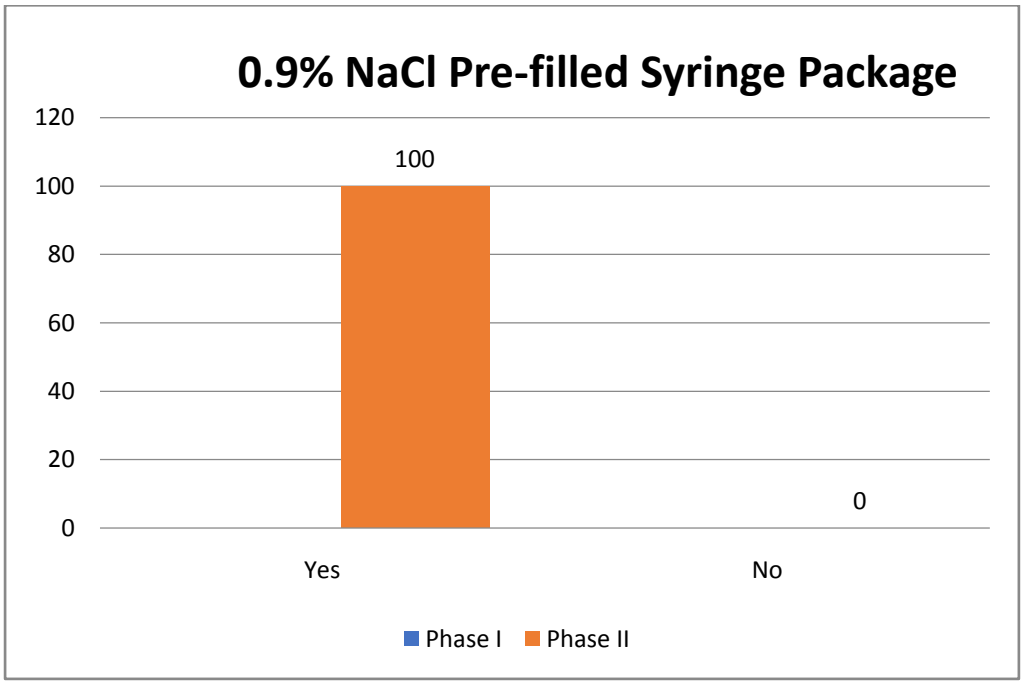
From the above table and graph it was observed that measuring tape were used for 100% subjects of phase II.

Figure 81: 0.9% NaCl Vial



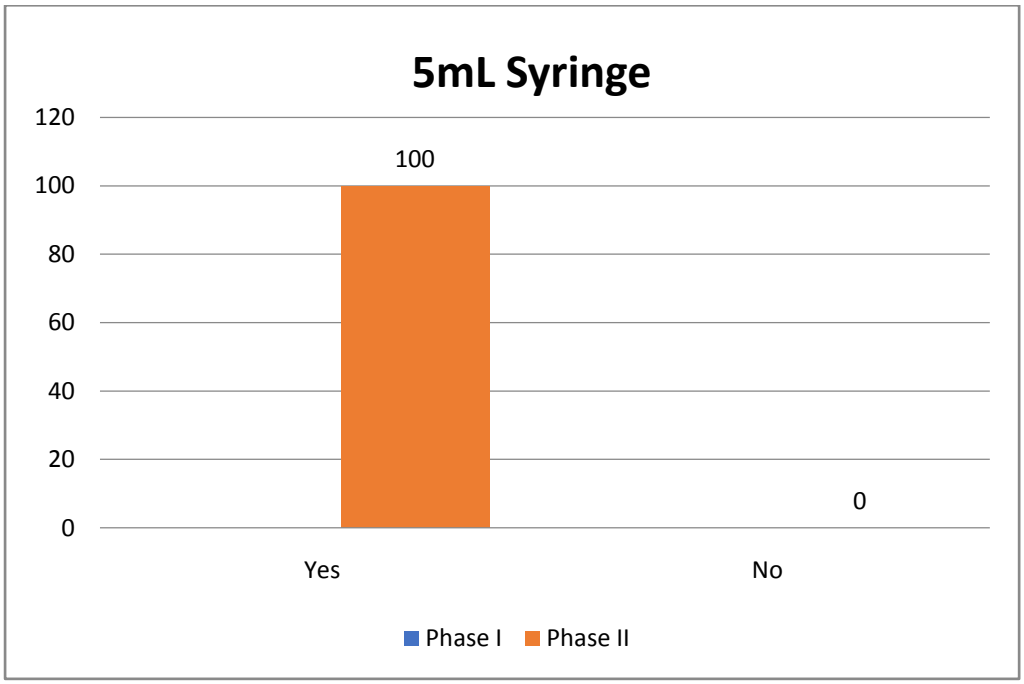
From the above table and graph it was observed that 0.9% NACL vial was used for 100% subjects of phase II.

Figure 82: 0.9% NaCl Pre-filled Syringe Package



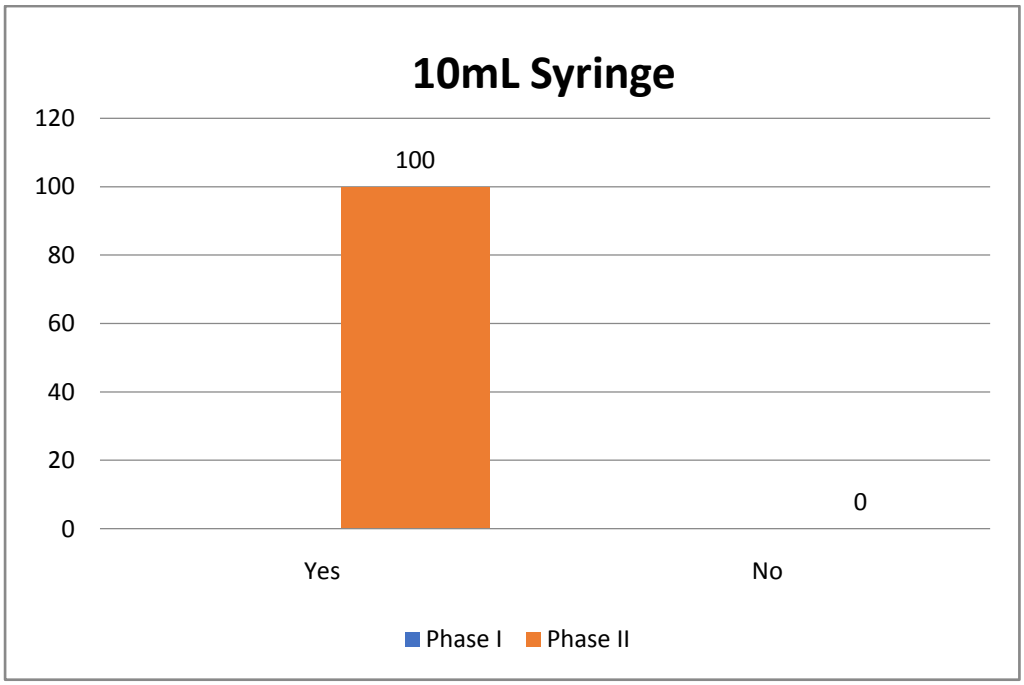
From the above table and graph it was observed that 0.9% NACL Pre-filled Syringe Package was used for 100% subjects of phase II.

Figure 83: 5 ml Syringe



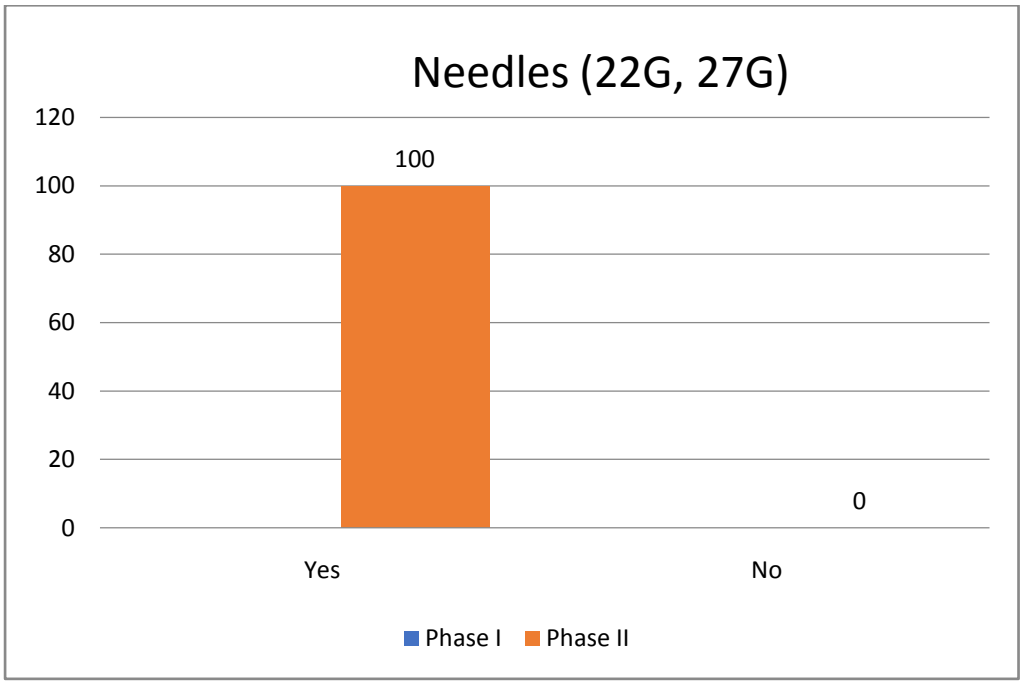
From the above table and graph it was observed that 5ml syringe was used for 100% subjects of phase II.

Figure 84: 10 ml syringe



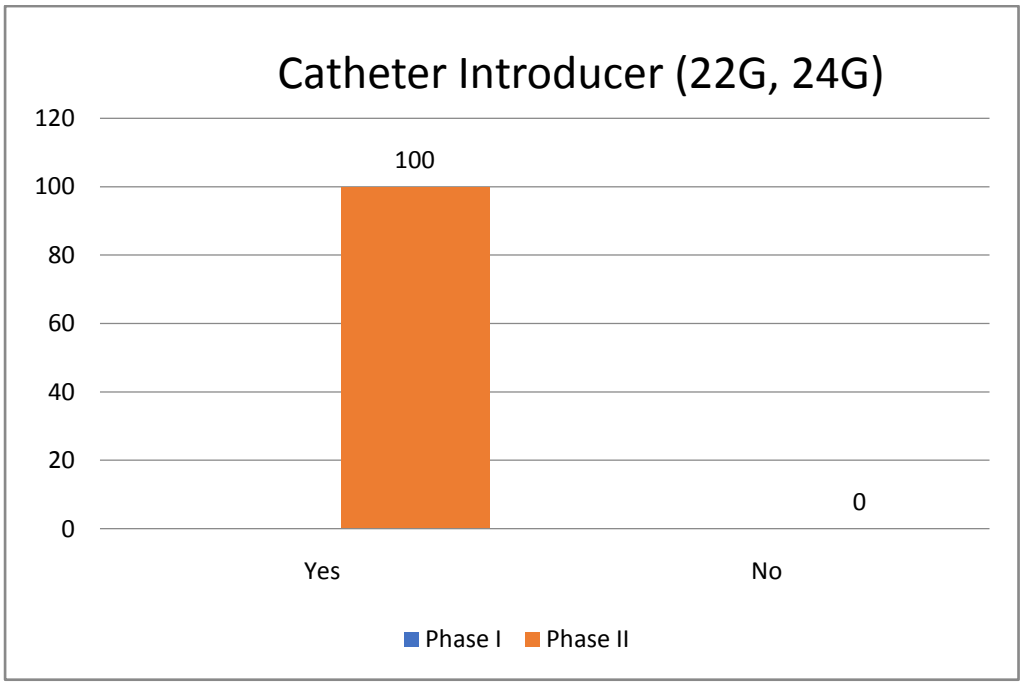
From the above table and graph it was observed that 10ml syringe was used for 100% subjects of phase II.

Figure 85: Needles (22G, 27G)



From the above table and graph it was observed that needles were used for 100% subjects of phase II.

Figure 86: Catheter Introducer (22G, 24G)



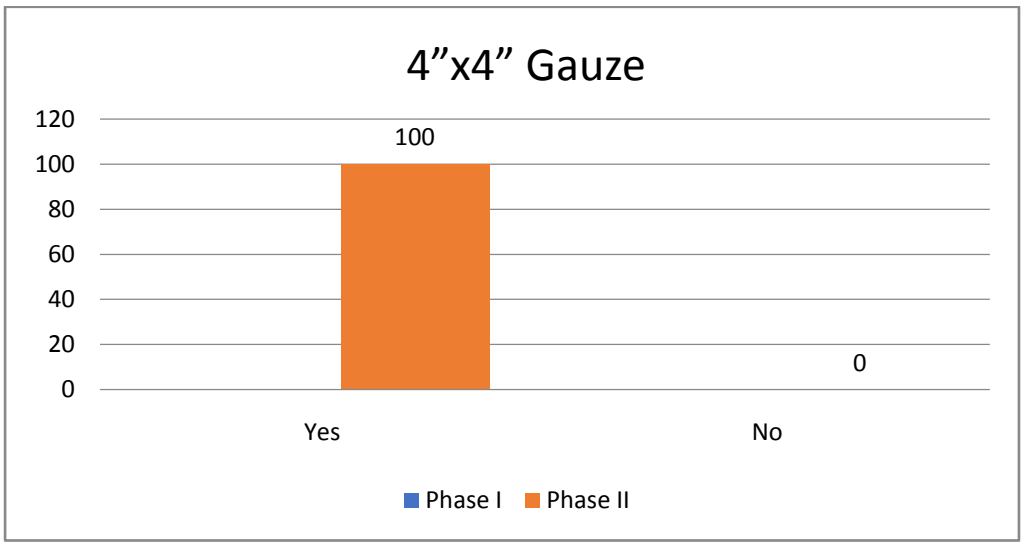
From the above table and graph it was observed that catheter introducer (22G, 24G) was used for 100% subjects of phase II.

Table 31: Insertion cart checklist

	Phase I	Phase II	P Value
4”x4” Gauze			
Yes	0 (0.00)	71 (100.0)	0.000
No	0 (0.00)	0 (0.00)	
Total	0 (00.0)	71 (100.0)	
2”x2” Gauze			
Yes	0 (0.00)	71 (100.0)	0.000
No	0 (0.00)	0 (0.00)	
Total	0 (00.0)	71 (100.0)	
#3.0 Silk Suture			
Yes	0 (0.00)	71 (100.0)	0.000
No	0 (0.00)	0 (0.00)	
Total	0 (00.0)	71 (100.0)	
Sterile Scissors and Tweezers set			
Yes	0 (0.00)	71 (100.0)	0.000
No	0 (0.00)	0 (0.00)	
Total	0 (00.0)	71 (100.0)	
IV Extension Set			
Yes	0 (0.00)	71 (100.0)	0.000
No	0 (0.00)	0 (0.00)	
Total	0 (00.0)	71 (100.0)	
Tegaderm small (4.4cm x 4.4cm)			
Yes	0 (0.00)	71 (100.0)	0.000
No	0 (0.00)	0 (0.00)	
Total	0 (00.0)	71 (100.0)	
Tegaderm medium (6cm x 7cm)			
Yes	0 (0.00)	70 (98.6)	0.000
No	0 (0.00)	1 (1.4)	
Total	0 (00.0)	71 (100.0)	

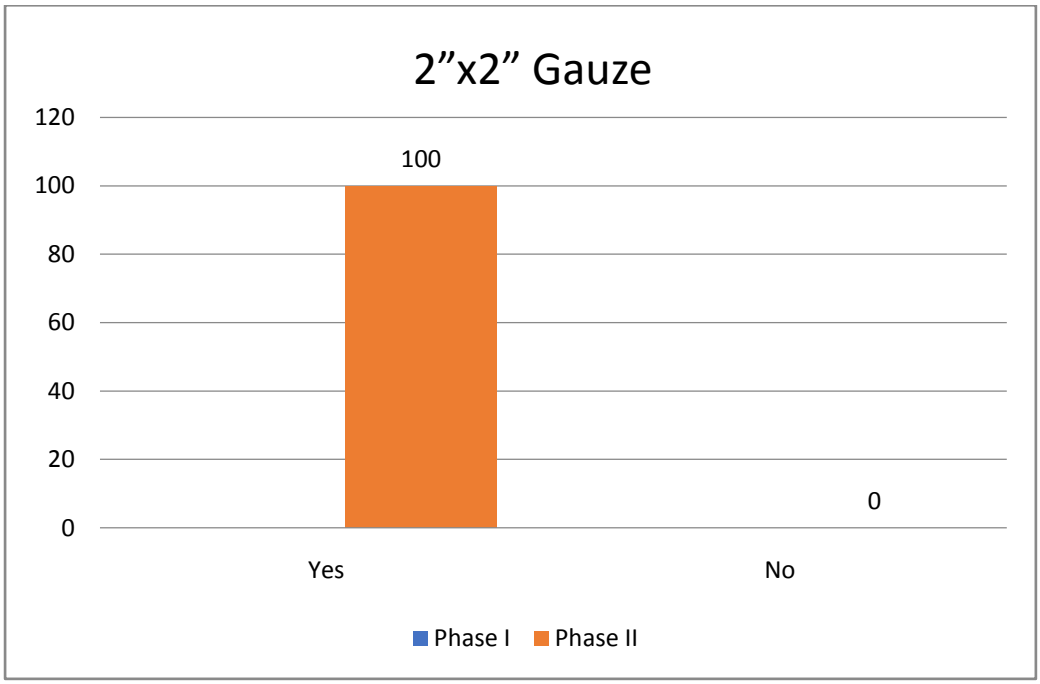
Tegaderm large (10cm x 12cm)			
Yes	0 (0.00)	71 (100.0)	0.000
No	0 (0.00)	0 (0.00)	
Total	0 (00.0)	71 (100.0)	
Clamps, non-tooth, non-sterile			
Yes	0 (0.00)	71 (100.0)	0.000
No	0 (0.00)	0 (0.00)	
Total	0 (00.0)	71 (100.0)	
Alcohol for cleaning cart top			
Yes	0 (0.00)	71 (100.0)	0.000
No	0 (0.00)	0 (0.00)	
Total	0 (00.0)	71 (100.0)	
Tapes			
Yes	0 (0.00)	71 (100.0)	0.001
No	0 (0.00)	0 (0.00)	
Total	0 (00.0)	71 (100.0)	

Figure 87: 4”x4” Gauze



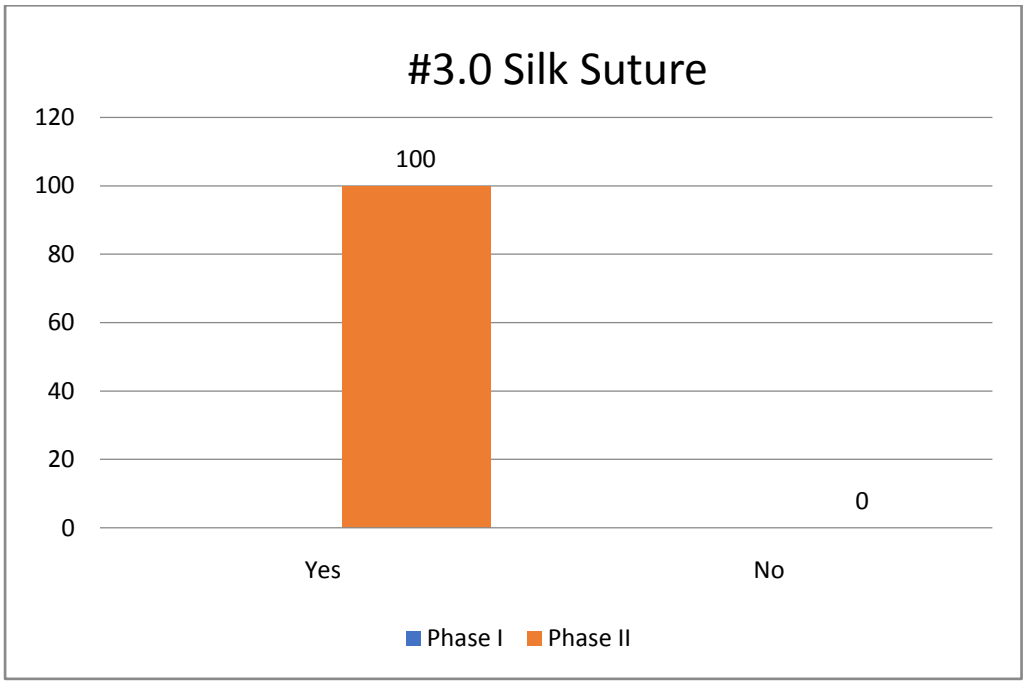
From the above table and graph it was observed that 4”x4” Gauze was used for 100% subjects of phase II.

Figure 88: 2”x2” Gauze



From the above table and graph it was observed that 2”x2” Gauze was used for 100% subjects of phase II.

Figure 89: #3.0 Silk Suture

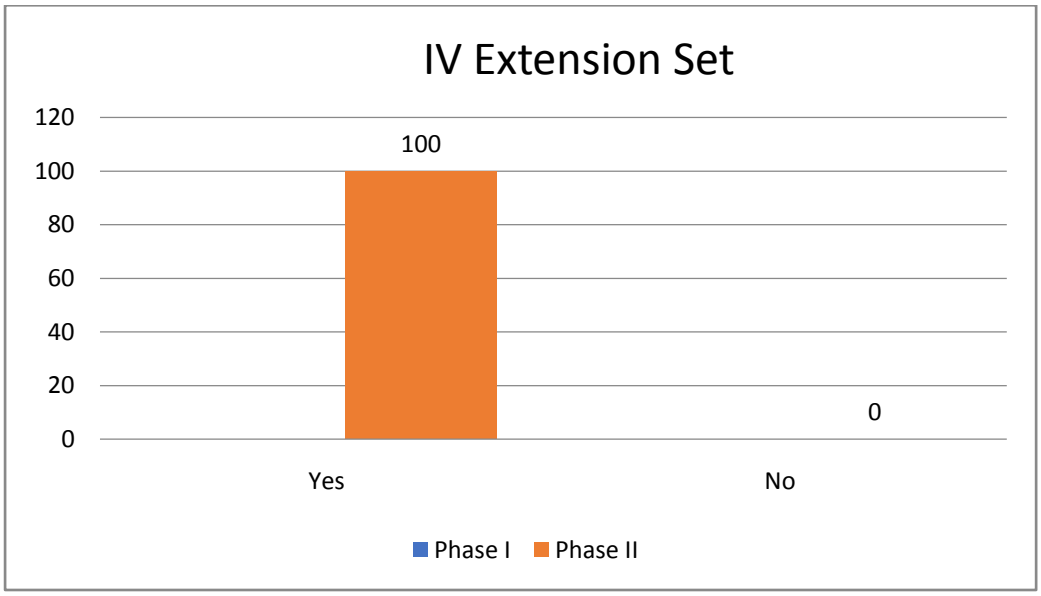


From the above table and graph it was observed that #3.0 Silk Suture was used for 100% subjects of phase II.

Figure 90: Sterile Scissors and Tweezers set

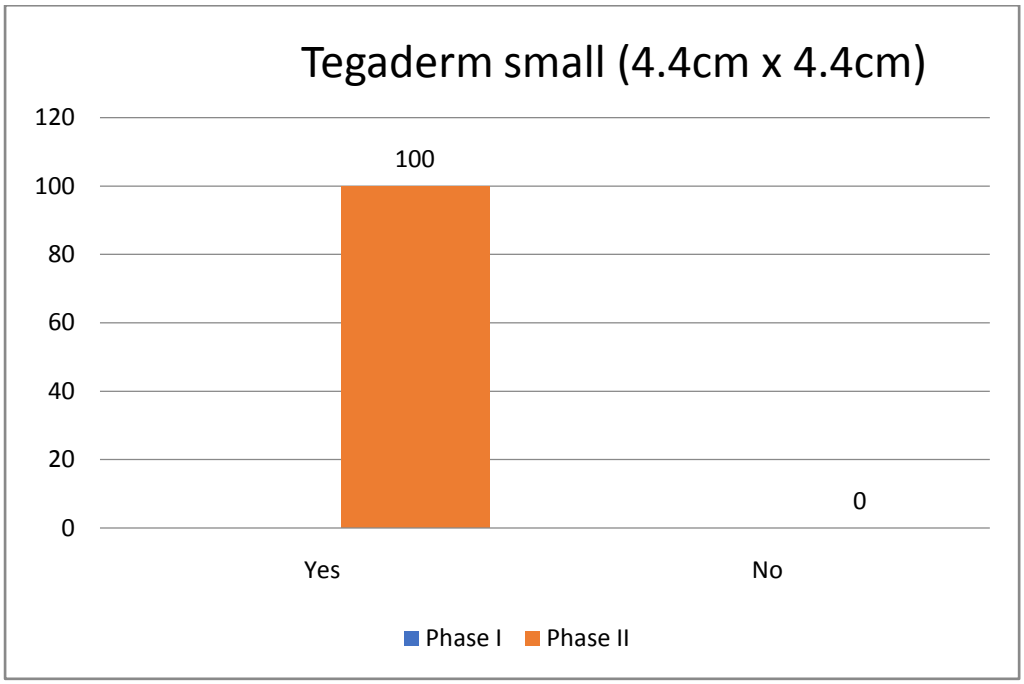
From the above table and graph it was observed that Sterile Scissors and Tweezers set was used for 100% subjects of phase II.

Figure 91: IV extension set



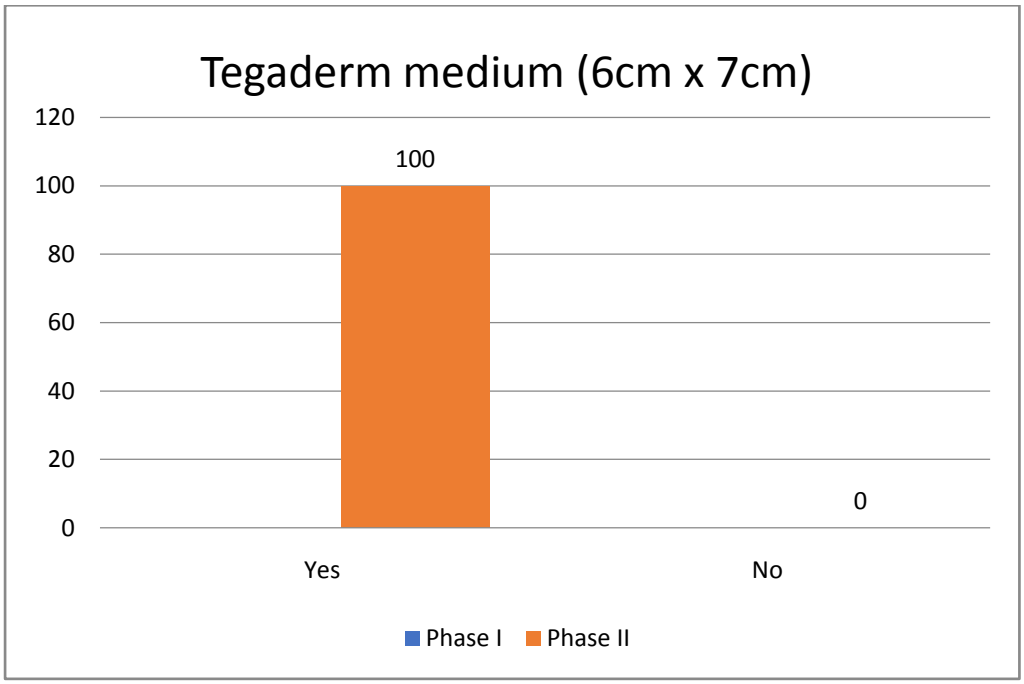
From the above table and graph it was observed that IV Extension Set was used for 100% subjects of phase II.

Figure 92: Tegaderm small (4.4 cm x 4.4 cm)



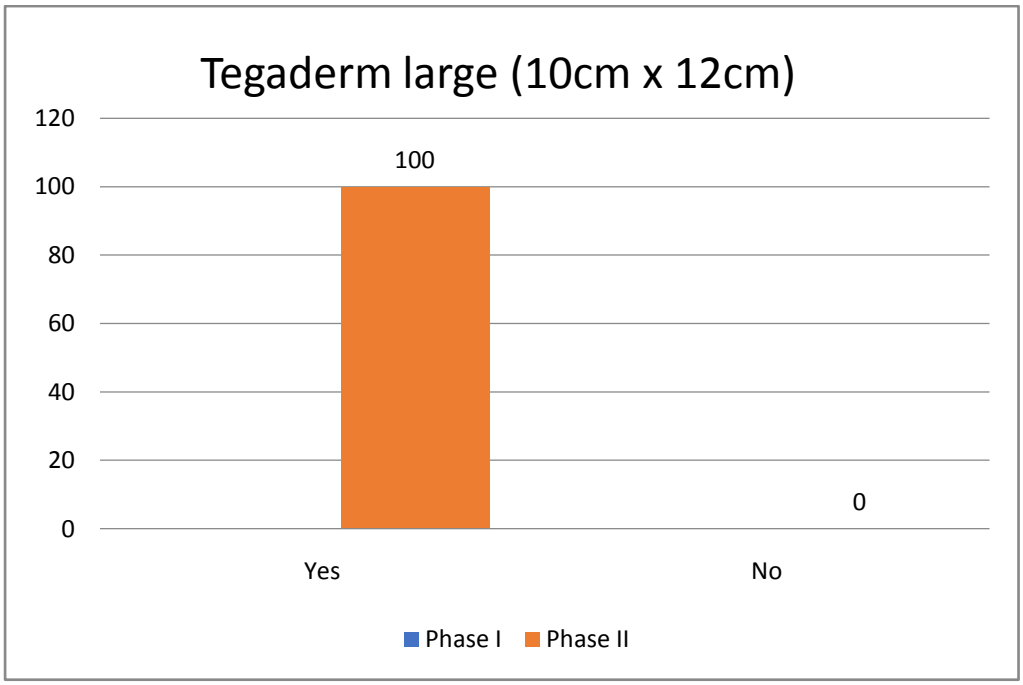
From the above table and graph it was observed that Tegaderm small (4.4cm x 4.4cm) was used for 100% subjects of phase II.

Figure 93: Tegaderm medium (6cm x 7cm)



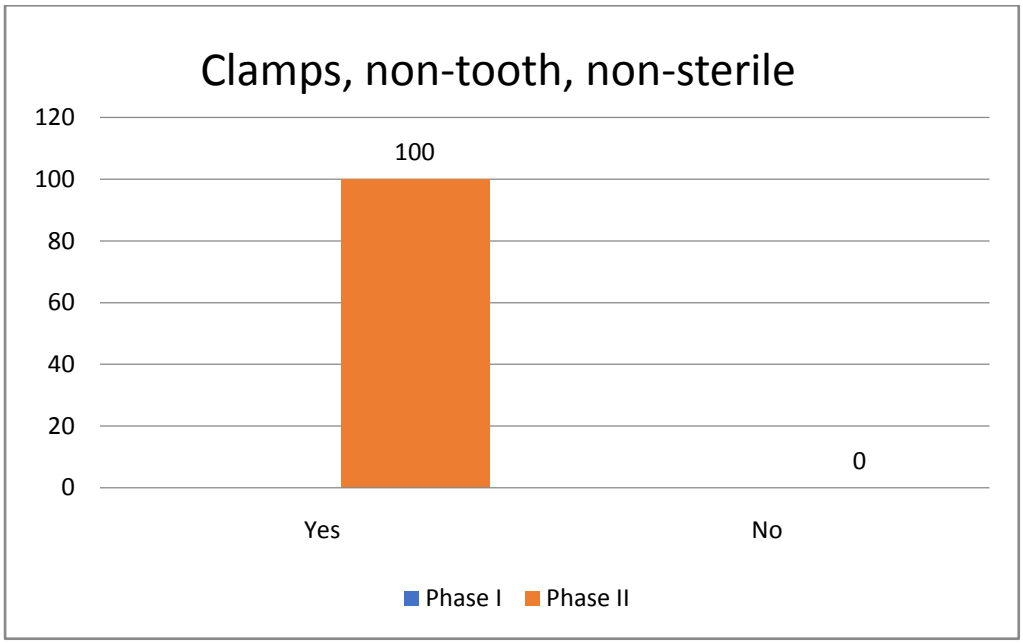
From the above table and graph it was observed that Tegaderm medium (6cm x 7cm) was used for 100% subjects of phase II.

Figure 94: Tegaderm large (10cm x 12cm)



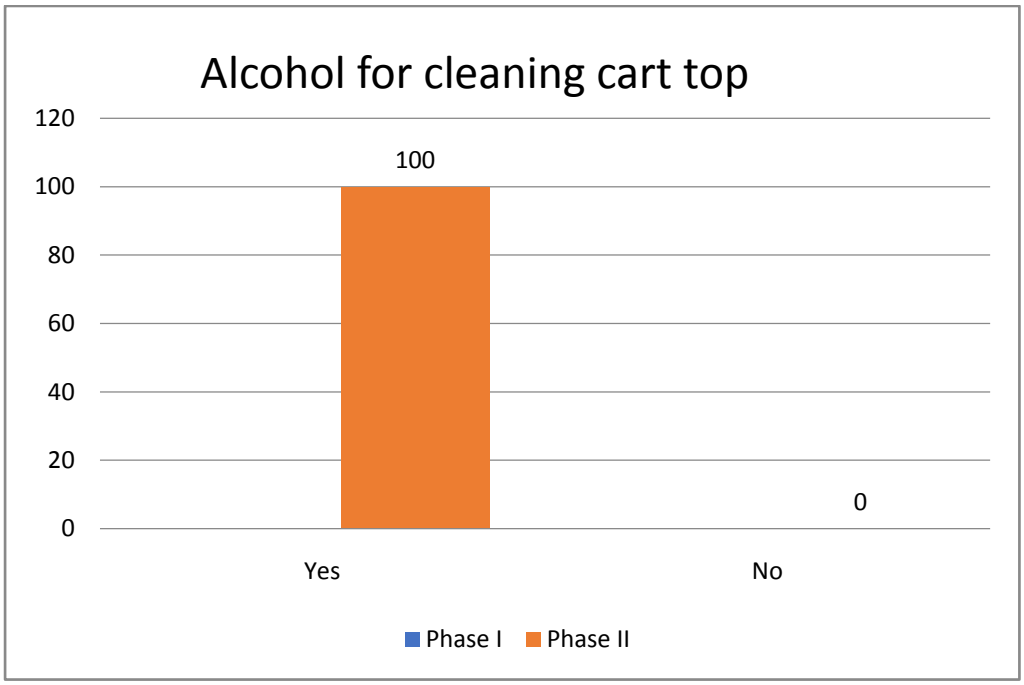
From the above table and graph it was observed that Tegaderm large (10cm x 12cm) was used for 100% subjects of phase II.

Figure 95: Clamps, Non tooth, non sterile



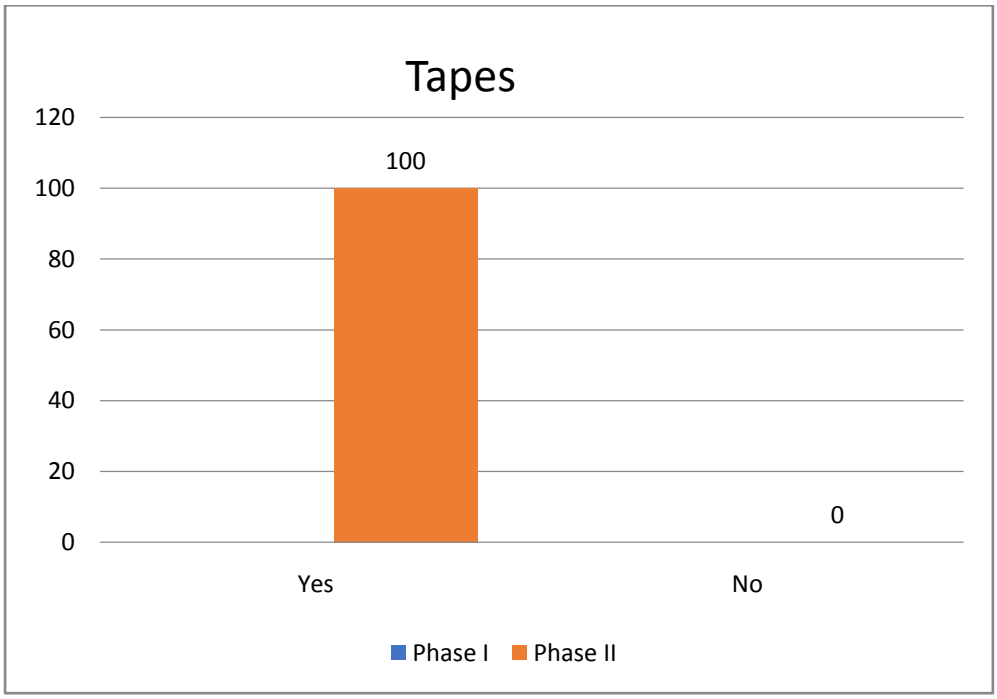
From the above table and graph it was observed that Clamps, non-tooth, non-sterile was used for 100% subjects of phase II.

Figure 96: Alcohol for cleaning cart top



From the above table and graph it was observed that alcohol for cleaning cart top was used for 100% subjects of phase II.

Figure 97: Tapes

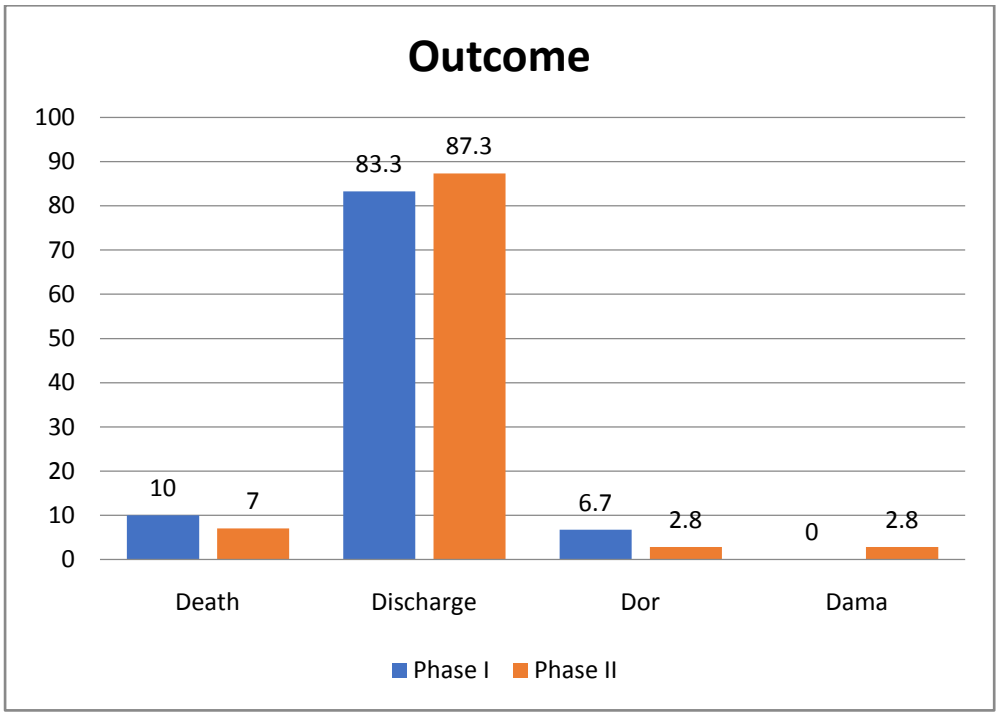


From the above table and graph it was observed that tapes were used for 100% subjects of phase II.

Table 32: Outcome

		Phase I		Phase II		Total	Chi-square value	p-value
		No. of cases	%age	No. of cases	%age			
OUTCOME	DAMA	0	0.0%	2	2.8%	2	1.906	0.592
	DEATH	3	10.0%	5	7.0%	8		
	Discharge	25	83.3%	62	87.3%	87		
	DOR	2	6.7%	2	2.8%	4		
Total		30	100.0%	71	100.0%	101		

Figure 98: Outcome



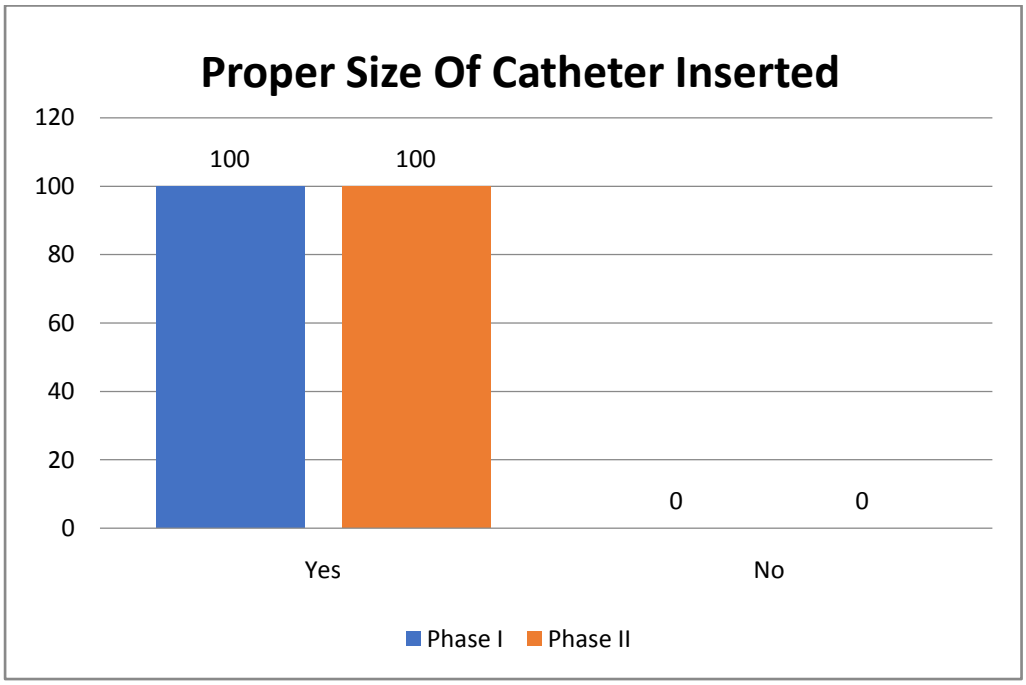
From the above table and graph it was observed that 10% death was reported in phase I subjects while 7% death was reported in phase II subjects and 83.3% subjects of phase I and 87.3% subjects of phase II were discharged.

Table 33: Procedure checklist 3

	Phase I	Phase II	P Value
Proper Size Of Catheter Inserted			
Yes	30 (100.00)	71 (100.00)	0.000
No	0 (0.00)	0 (0.00)	
Total	0 (00.0)	71 (100.0)	
Back Flow Checked			
Yes	30 (100.00)	71 (100.00)	0.000
No	0 (0.00)	0 (0.00)	
Total	0 (00.0)	71 (100.0)	
Washing Hands Prior To Touching The Line			
Yes	29 (96.7)	71 (100.00)	0.000
No	1(3.3)	0 (0.00)	
Total	30 (100.0)	71 (100.0)	
Closed System			
Yes	30 (100.00)	71 (100.00)	0.000
No	0 (0.00)	0 (0.00)	
Total	0 (00.0)	71 (100.0)	
Is The Line Being Placed Away From Potential Areas Of Contamination			
Yes	30 (100.00)	71 (100.00)	0.000
No	0 (0.00)	0 (0.00)	
Total	0 (00.0)	71 (100.0)	
Scrubbing Up And Down On The IV Tubing And Line?			
Yes	30 (100.00)	71 (100.00)	0.000
No	0 (0.00)	0 (0.00)	
Total	0 (00.0)	71 (100.0)	

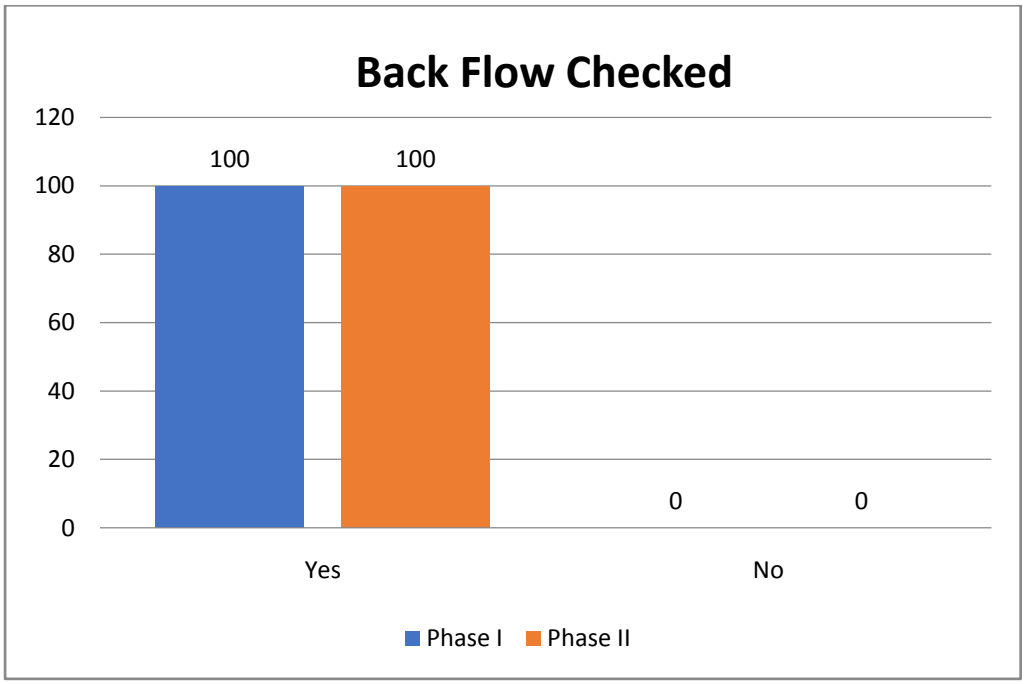
Does The Nurse Wait For The Port To Dry After Swabbing Before Accessing?			
Yes	30 (100.00)	71 (100.00)	0.000
No	0 (0.00)	0 (0.00)	
Total	0 (00.0)	71 (100.0)	
Umbilical Line Dressing Changed Routinely			
Yes	30 (100.00)	71 (100.00)	0.000
No	0 (0.00)	0 (0.00)	
Total	0 (00.0)	71 (100.0)	

Figure 99: Proper size of catheter inserted



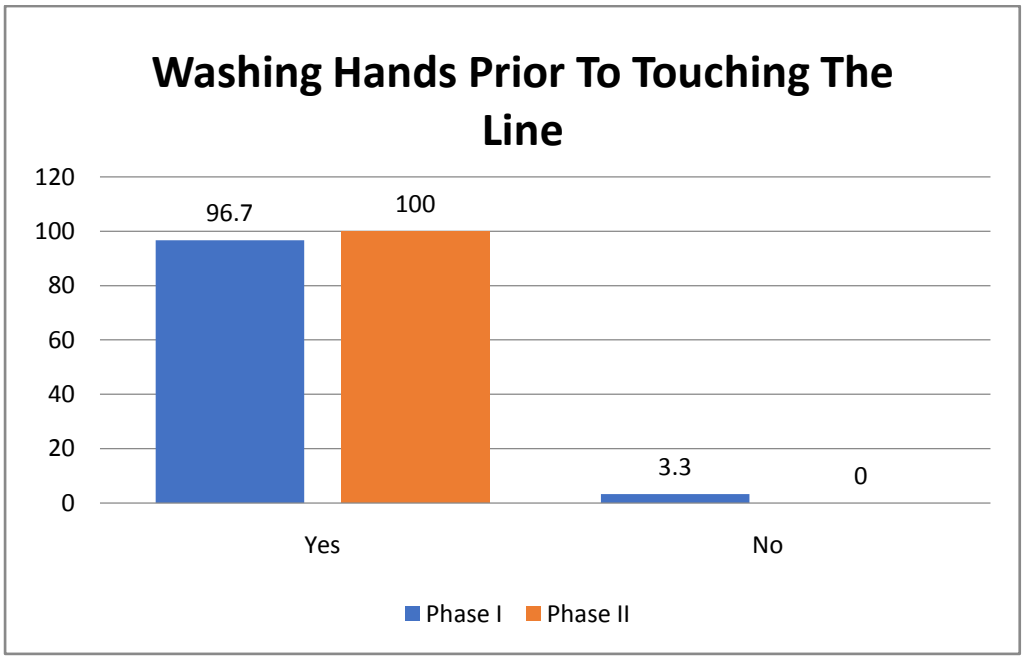
From the above table and graph it was observed that proper size of catheter was inserted in 100% subjects of phase I and phase II.

Figure 100: Back flow checked



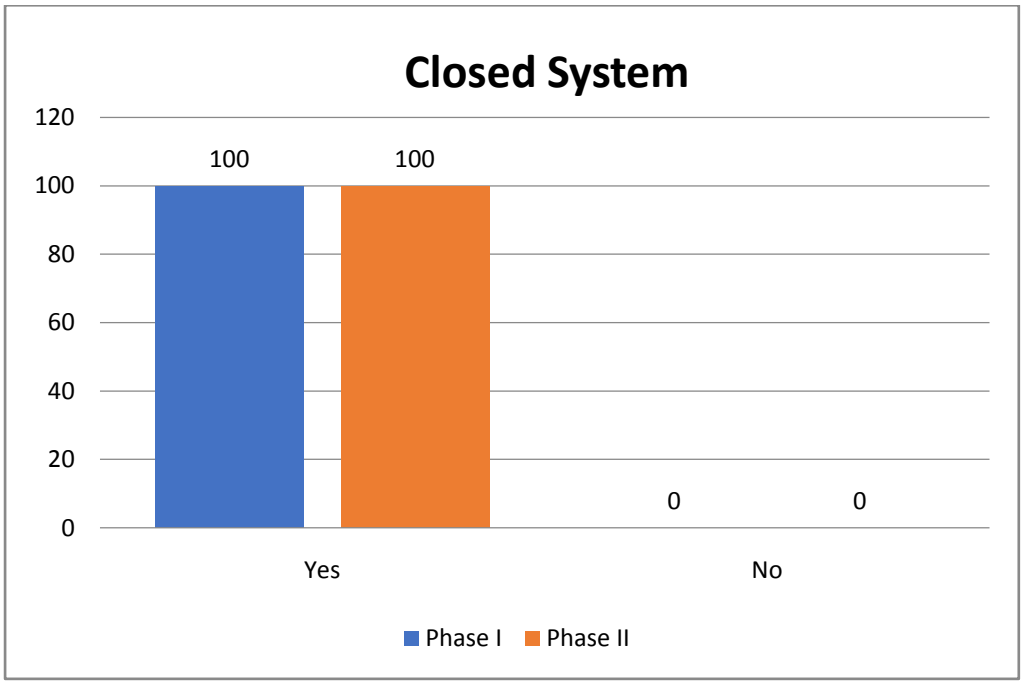
From the above table and graph it was observed that back flow was checked for 100% subjects of phase I and phase II.

Figure 101: Washing Hands prior to touching the line



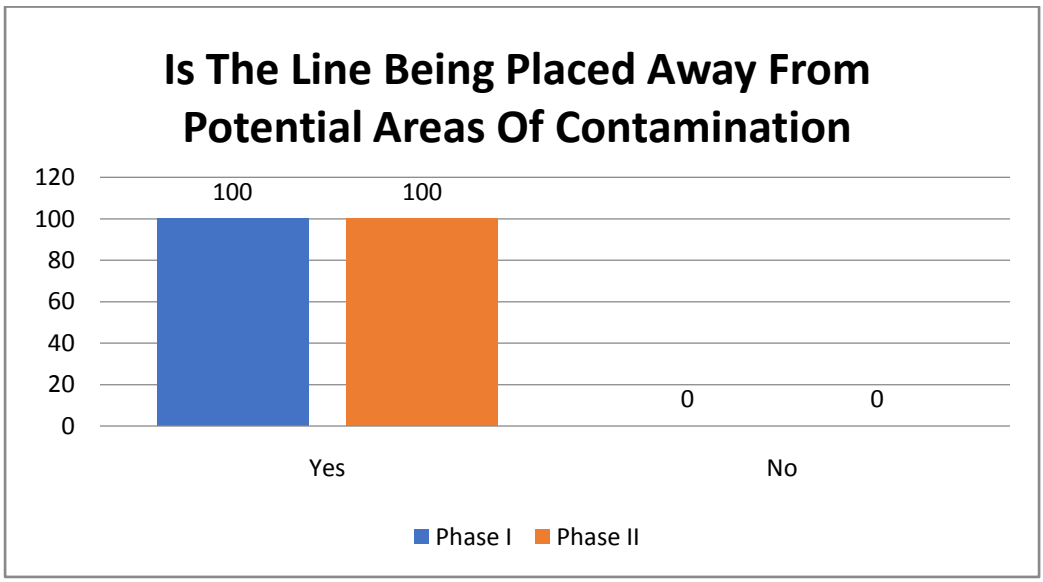
From the above table and graph it was observed that washing hands prior to touching the line was performed for 96.7% subjects of phase I and 100% in phase II.

Figure 102: Closed system



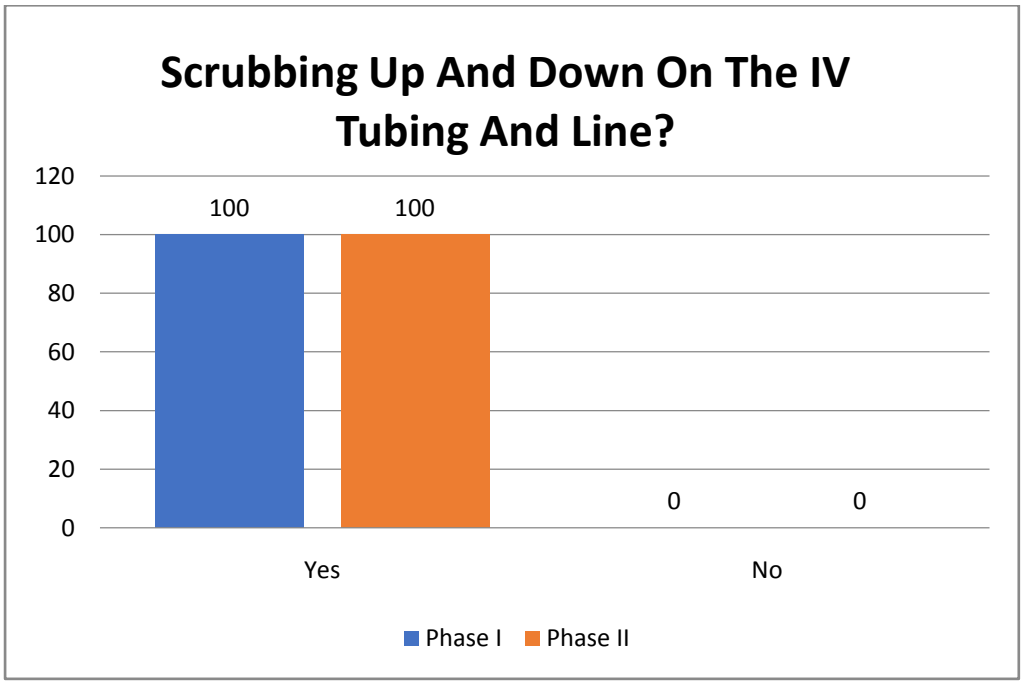
From the above table and graph it was observed that closed system was used for 100% subjects of phase I and phase II.

Figure 103: Is The Line Being Placed Away From Potential Areas Of Contamination



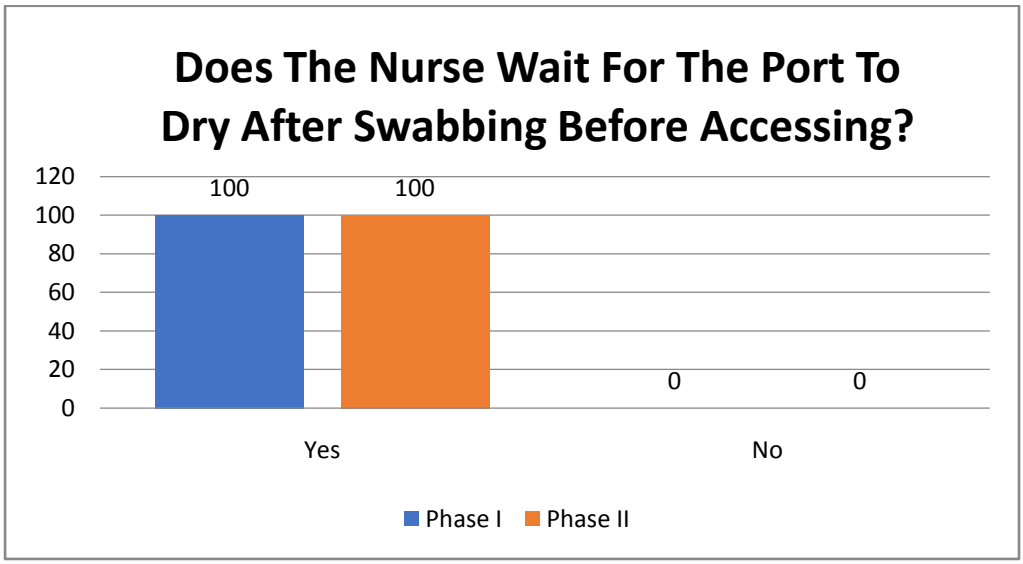
From the above table and graph it was observed that line was placed away from potential areas of contamination for 100% subjects of phase I and phase II

.Figure 104: Scrubbing Up And Down On The IV Tubing And Line?



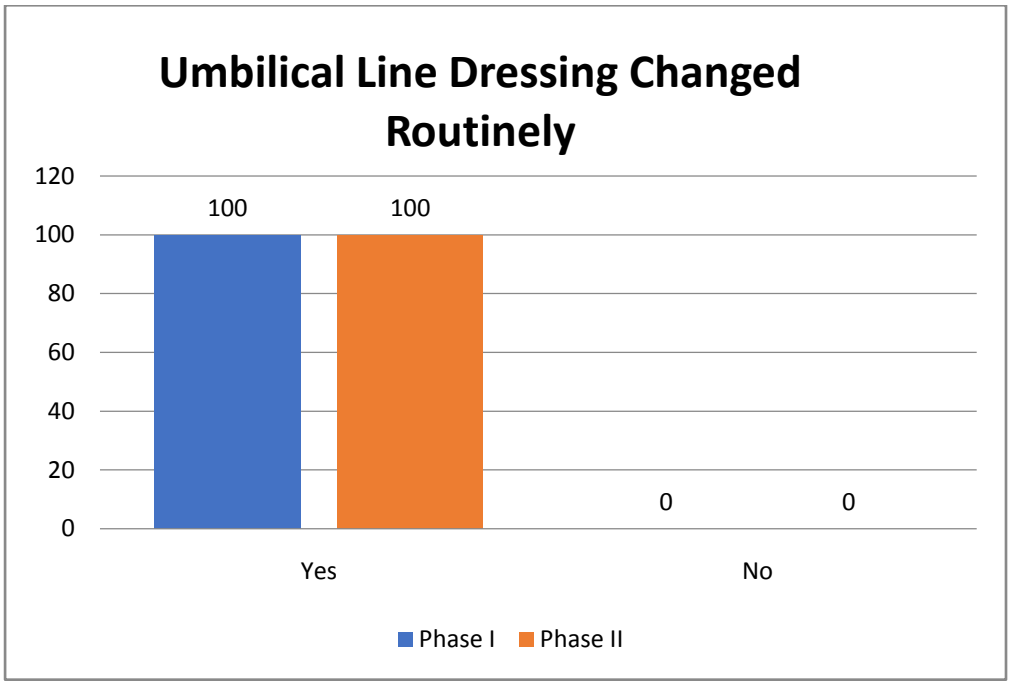
From the above table and graph it was observed that scrubbing up and down on the IV tubing and line was performed for 100% subjects of phase I and phase II.

Figure 105: Does The Nurse Wait For The Port To Dry After Swabbing Before Accessing?



From the above table and graph it was observed that nurse has waited for the part to dry after swabbing before assessing for 100% subjects of phase I and phase II.

Figure 106: Umbilical Line Dressing Changed Routinely



From the above table and graph it was observed that umbilical line dressing was changed routinely for 100% subjects of phase I and phase II.

Table 34: Difference between phase I and phase II

Attributes	Baseline (Phase I)	Phase II
ULABSI/ 1000-line days	6.9	0.0
Umbilical line days/ 1000 patient days	5.07	3.91
No. of neonates	30 (33.3%)	71 (66.7%)
Mean Birth weight (in grams)	1587	1468
Mean Gestation (in weeks)	30.73	30.71
Sex (males)	20 (66.7%)	40 (56.3%)
Hand Hygiene	27/30 (90%)	67/71(94.4%)
No. of umbilical lines	30 (100%)	71 (100%)
Time taken to insert umbilical line (mean)	22.50	11.62
Line inserted by Fellows/JRs	1/29 (3.3%/ 96.7%)	71/0 (100%/0)
Umbilical Catheter tip culture (no growth)	24 (80%)	65 (91.5%)
Blood Culture (no growth)	28 (93.3%)	67 (94.4%)
Implementation of insertion bundle checklist	0	100%
No. of line days (mean)	10.30	7.94
Outcomes (deaths)	10%	7%

Table 35 A: PDSA results

		PDSA										Total
		0		1		2		3		4		
	No. of neonates	30		14		11		15		31		101
Gender	FEMALE	10	33.30%	5	35.70%	2	18.20%	7	46.70%	17	54.80%	41
	MALE	20	66.70%	9	64.30%	9	81.80%	8	53.30%	14	45.20%	60
Respiratory Failure	Y	17	56.70%	8	57.10%	5	45.50%	9	60.00%	24	77.40%	63
Blood culture	E.Coli	1	3.30%	1	7.10%	0	0.00%	0	0.00%	0	0.00%	2
	Candida Ciferri	0	0.00%	0	0.00%	0	0.00%	0	0.00%	1	3.20%	1
	candida parasilosis	1	3.30%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	1
	candida tropicalis	0	0.00%	0	0.00%	0	0.00%	0	0.00%	1	3.20%	1
	klebsiella pneumoniae	0	0.00%	0	0.00%	0	0.00%	0	0.00%	1	3.20%	1
	No growth	28	93.30%	13	92.90%	11	100.00%	15	100.00%	28	90.30%	95
Umbilical catheter tip culture	Psuedomonas sp	1	3.30%	1	7.10%	1	9.10%	0	0.00%	0	0.00%	3
	Acinetobacter Baumanii+++	0	0.00%	0	0.00%	0	0.00%	1	6.70%	0	0.00%	1
	E.Coli++	4	13.30%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	4
	Enterococcus feacium	0	0.00%	1	7.10%	0	0.00%	1	6.70%	0	0.00%	2
	Staphylococcus Aureus	1	3.30%	1	7.10%	0	0.00%	0	0.00%	0	0.00%	2
	No growth	24	80.00%	11	78.50%	10	90.90%	13	86.70%	31	100%	89
HAND WASH Done	YES	27	90.00%	11	78.60%	10	90.90%	15	100.00%	31	100.00%	94
HAND WASH Adequate time for hand hygiene	YES	0	0.00%	12	85.70%	11	100.00%	14	93.30%	30	96.70%	67
Heparin connected to umbilical artery line	YES	0	0.00%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	71

Periodical checks for local sighs of inflamma-tionswelling	YES	0	0.00%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	71
Watch for lower limb colour and perfusion	YES	0	0.00%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	71
Assemble equipment/verify supplies	YES	0	0.00%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	71
Inform Radiology	YES	0	0.00%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	71
Assess, cleanse the site	YES	0	0.00%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	71
Position patient correctly for procedure	YES	0	0.00%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	71
Wear sterile gown and gloves	YES	0	0.00%	14	100.00%	11	100.00%	14	93.30%	31	100.00%	70
Drape a large area exposing ONLY site	YES	0	0.00%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	71
Prepare site with 2% chlorhexidine / 4% alcohol solution	YES	0	0.00%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	71
Prepare site for 30 seconds	YES	0	0.00%	14	100.00%	11	100.00%	15	100.00%	30	96.80%	70
Dry for up to 60 seconds without fanning / wiping	YES	0	0.00%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	71
Maintain sterile field throughout procedure	YES	0	0.00%	11	78.60%	10	90.90%	15	100.00%	31	100.00%	67

Did the assistant follow the same precautions? (Hand washing, mask, gloves and gown)	YES	0	0.00%	13	92.90%	9	81.80%	14	93.30%	31	100.00%	67
Was sterility maintained when applying dressing/ stitches?	YES	0	0.00%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	71
Was sterile field compromised during line readjustment?	YES	0	0.00%	5	35.70%	2	18.20%	2	13.30%	1	3.20%	10
Were IV fluids/lines being attached aseptically?	YES	0	0.00%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	71
Is the umbilical line dressing changed routinely?	YES	0	0.00%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	71
TOP SHELF Sterile Towels	YES	0	0.00%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	71
Sterile Gowns	YES	0	0.00%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	71
Caps (in plastic bag)	YES	0	0.00%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	71
Masks	YES	0	0.00%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	71
UAC Trays	YES	0	0.00%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	71
BOTTOM SHELF_#6 Fr. Single Lumen Umbilical line	YES	0	0.00%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	71
#5 Fr. Single Lumen Umbilical line	YES	0	0.00%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	71
#3.5 Fr. Single Lumen Umbilical line	YES	0	0.00%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	71

#3 Fr, Single Lumen Umbilical line	YES	0	0.00%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	71
Drawers_ Sterile gloves	YES	0	0.00%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	71
Measuring Tape	YES	0	0.00%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	71
0.9% NaCl Vial	YES	0	0.00%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	71
0.9% NaCl Pre-filled Syringe Package	YES	0	0.00%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	71
5mL Syringe	YES	0	0.00%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	71
10mL Syringe	YES	0	0.00%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	71
Needles (22G, 27G)	YES	0	0.00%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	71
Catheter Introducer (22G, 24G)	YES	0	0.00%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	71
4”x4” Gauze	YES	0	0.00%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	71
2”x2” Gauze	YES	0	0.00%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	71
#3.0 Silk Suture	YES	0	0.00%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	71
Sterile Scissors and Tweezers set	YES	0	0.00%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	71
IV Extension Set	YES	0	0.00%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	71
Tegaderm small (4.4cm x4.4cm)	YES	0	0.00%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	71
Tegaderm medium (6cm x7cm)	YES	0	0.00%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	71
Tegaderm large (10cmx12cm)	YES	0	0.00%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	71
Clamps, non-tooth, non-sterile	YES	0	0.00%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	71
Alcohol for cleaning cart top	YES	0	0.00%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	71
Tapes	YES	0	0.00%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	71

OUTCOME Discharge	DAMA	0	0.00%	1	7.10%	0	0.00%	1	6.70%	0	0.00%	2
	DEATH	3	10%	0	0.00%	1	9.10%	1	6.70%	3	9.70%	8
	Discharge	25	83.30%	12	85.70%	10	90.90%	13	86.70%	27	87.10%	87
	DOR	2	6.70%	1	7.10%	0	0.00%	0	0.00%	1	3.20%	4
• Proper size of catheter inserted	YES	30	100%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	101
• Back flow checked	YES	30	100%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	101
Washing hands prior to touching the line	YES	29	96.70%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	100
closed system	YES	30	100%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	101
is the line being placed away from potential areas of contamination	YES	30	100%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	101
scrubbing up and down on the IV tubing and line?	YES	30	100%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	101
Does the nurse wait for the port to dry after swabbing before accessing?	YES	30	100%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	101
umbilical line dressing changed routinely	YES	30	100%	14	100.00%	11	100.00%	15	100.00%	31	100.00%	101
Age	Mean ± SD	1.73	2.664	1.36	0.929	1	0	1.53	1.552	1.06	0.359	
Gest. Age	Mean ± SD	30.73	3.61	30.29	2.84	30.64	3.641	31.73	4.698	30.19	3.381	
Time taken	Mean ± SD	22.5	3.884	11.79	3.118	13.73	4.315	10.93	2.463	11.13	3.64	
No of days of umbilical line	Mean ± SD	10.3	2.769	8.57	2.441	7.91	3.833	7.33	3.222	7.97	1.722	
umbilical line rate	Mean ± SD	11.798	3.1716757	9.817857	2.7969411	9.059091	4.3893746	8.401333	3.6912752	9.1252	1.971544	
WEIGHT	Mean ± SD	1587.33	736.797	1380.71	552.8	1647.73	632.627	1626.67	935.761	1367.4	464.394	

Table 35 B: PDSA results

Umbilical line days/1000 patient days	5.07	4.22	3.89	3.61	3.92
Umbilical catheter tip culture/1000 line days	6.9	3.4	1.1	2.3	0.0

Figure 107: Umbilical line days/ 1000 patient days

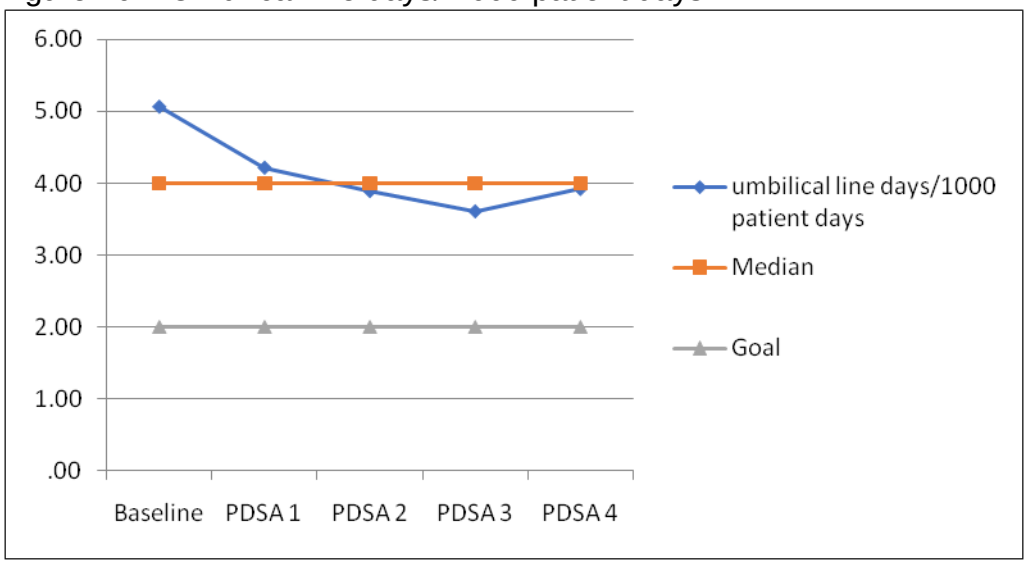
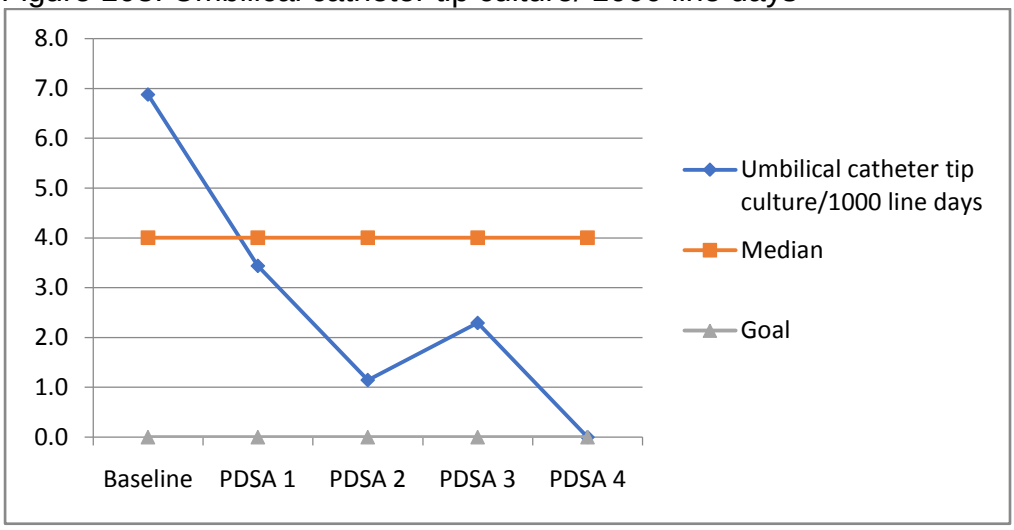


Figure 108: Umbilical catheter tip culture/ 1000 line days



A total of 101 neonates were part of this QI study. Standard operating principle based on aseptic non touch technique was formed in the baseline period, which had components of hand hygiene, training to insert the umbilical line. After the baseline period, PDSA cycles were sequentially introduced (table 2).

In PDSA1, trained personnel for umbilical line insertion started inserting lines, hand hygiene compliance improved from 90% to 94% and with adequate time 0 to 85.7%, aseptic field usage compliance improved.An insertion bundle list and maintenance checklist made during baseline period which was displayed and teaching sessions were conducted and was being followed. Forgetfulness was the major reason behind the ULABSI and remainder by fellow team helped improving the compliance.

In PDSA 2, regular video demonstration were done and posters were presented, compliance with hand hygiene with adequate time improved considerably (85.7% to 100%), maintain sterile field throughout procedure (from 78.6% to 90.9%). There was a drop in compliance of proper preparation for aseptic technique by assistant (from 92.9% to 81.8%). This sudden drop was attributed to entry of the new staff to the unit who were not aware of the principles of aseptic non touch technique.

In PDSA3, with continued training, practice of hand hygiene compliance improved to 100% but taking adequate time for hand hygiene reduced due to entry of new staff. Sickness of neonates also became a major component in following the aseptic techniques. The admitted neonates' sickness level, like ventilatory support increased . The compliance was poor, especially if the baby was critically sick example baby having seizure/shock/cardiac arrest. Overall hand hygiene compliance improved , sterility break by assistant reduced, compromise of sterile field during readjustment reduced (from 35.7% to 3.2%).

Overall improvement in compliance to ANTT principles in the intravenous line maintenance followed a gradual decrease in HCAI in the unit from 6.9 per 1000 patient days to 3.4 and subsequently to 0.0 per 1000 patient days (median) over 9 months (figure 3).The overall mortality showed a reduction from 10% to 7 % during the intervention period.

DISCUSSION

Umbilical Line Catheterisation is the most common healthcare associated infection in Neonatal Intensive Care Unit imposing significant burden on affected neonate and on healthcare system. Umbilical catheter insertion and stay introduces risk of infection, increased hospitalization stay and costs. Due to certain factors in low-resource countries, umbilical line associated blood stream infections (ULABSI) are unaddressed and under-reported.

The present study was aimed to assess the effect of quality improvement initiative on umbilical line associated blood stream infection in neonatal intensive care unit. This was a prospective cohort study performed in 30 bedded NICU in a tertiary care hospital. Root cause analysis of ULABSI was performed. The study was conducted in 2 phases in which phase I was data collection (3 months), Phase II intervention period was of 9 months. This includes staff education, standardization of skin preparation protocol, introduction of new antiseptic agents, implementation of umbilical catheter insertion and maintenance checklists, reinforcement of the use of maximal sterile barrier precautions, and revision of the umbilical catheter configuration and maintenance protocols.

Previous studies[28] have showed that the central line care bundle is most effective when all the mentioned elements are executed together and not singularly. The application of this approach has been demonstrated to reduce central line infection rates in many hospitals, with many ICUs that have implemented the multifaceted intervention having nearly eliminated CLABSI incidences. The educational intervention of hand hygiene and training on the catheter handling are two most important preventive measures in the reduction of ULABSI[28,69,70,71]

In the present study there were 30 subjects in phase I and 71 subjects in phase II. The baseline characteristics of the babies admitted to the NICU were similar between the phase I and phase II (intervention period). The study found out that majority of study subjects belongs to

gestational age group of 28 to 30 weeks. The mean birthweight of subjects in phase I and phase II was 1587.3333 ± 736.79728 g and 1468.2394 ± 630.83793 g respectively.

In a reference study by Balla et al., (2018)[28] it was found that 338 infants were admitted to the NICU in the baseline period of the study. A total of 1227 neonates were admitted in the NICU in the intervention period of the study. The mean gestational age in the baseline period was 34 weeks and in intervention phases was 33-35 weeks. The mean birthweight in all the phases was between 2000 and 2100 g. The mean birthweight was slightly lower in our study as compared to the reference study.

In Balla et al., (2018)[28] study, there were a total of 54 central lines inserted during baseline period and 175 central lines in intervention period. Checklists for the central line insertion were used in 112 of the 175 central lines inserted. In the present study, total 101 umbilical lines were inserted (30 in phase I and 71 in phase II).

In the present study, Prematurity (63%), mechanical ventilation (64.8%) and inotropic support (26%) was the most common indication for insertion of umbilical line in phase II subjects while prematurity (20%), IBP monitoring (10%) and inotropic support (6%) was the most common indication for insertion of umbilical line in phase I subjects. The study found out that umbilical line was inserted by a fellow in 3.3% subjects of phase I while it was inserted by a fellow in 100% subjects of phase II. The study found out that majority of subjects in phase I had longer duration of umbilical line stay i.e. mean of 10.30 ± 2.77 which reduced to mean of 7.94 ± 2.59 with the p- value of 0.001. The mean umbilical line rate was 11.80 ± 3.17 and 9.10 ± 2.97 in phase I and phase II respectively with the mean difference of 2.70 and p value of 0.001.

In Bannatyne et al (2018)[63], the Central Line Utilisation Ratio (CLUR) showed a significant decline in CLUR between the baseline and intervention periods ($p<0.001$).

Central line utilisation ratio (CLUR: ratio of central line days to bed days) reduced between pre- and post intervention periods from 0.177 (4414/25013) to 0.13 (3633/27384; p<0.001).

The results of the study have signified that during phase I improper hand hygiene, skin preparation, and proper catheter handling and prolonged line days was followed, as compared to phase II. During phase II, standardization of skin preparation protocol, use of antiseptic agents, implementation of umbilical catheter insertion and maintenance checklists, reinforcement of the use of maximal sterile barrier precautions, and revision of the umbilical catheter configuration and maintenance protocols was properly followed in majority of the cases.
The study found out that hand hygiene and adequate time for hand hygiene has increased significantly in phase II as compared to phase I (p<0.05). The study also found out that proper skin preparation, use of antiseptic agents, maintaining sterility, precautions for umbilical catheter insertion and maintenance checklists has increased significantly. These findings were consistent with the findings of previous studies. Balla et al., (2018) in their study reported that hand hygiene overall compliance rates increased from 0% to around 50%. Various other studies conducted as large collaborative efforts have shown similar trends of results with care bundle approach and strengthening using QI principles. Fisher, et al., (2013)[71] published similar reduction in the rates of CLABSI by 71% over a period of 1 year among NICUs. There was also associated decrease in mortality between the two-time frames of the study by 42% simply confirming the fact that NICU infection rates contribute significantly to the overall outcomes. Different studies have shown that surveillance of existing data, assessment of knowledge on a regular basis, checklist guided insertion practices and care bundle approaches have resulted in decreased CLABSI rates.[53,71] The present study have shown that percentage of hand hygiene was 90% during phase I which improved to 94.4% in phase II. The adequate time for hand hygiene also showed

improvement to 95.8% showing increasing compliance with care bundle.

The study found significant decrease in ULABSI rate i.e. umbilical catheter tip culture per 1000 line days from 6.9 in baseline period to 3.4 in PDSA 1 of phase II, 1.1 in PDSA 2, 2.3 in PDSA 3 and 0.0 in PDSA 4 in phase II as compared to phase I. Bannatyne et al., (2018)[63] published rates of CLABSI and central line utilisation were examined following the introduction of a central line bundle in Neonatal Intensive Care Unit (NICU) at the Canberra Hospital. The results showed a significant decrease in CLABSI rates from 8.8 per 1,000 central line days to 4.9 per 1,000 central line days in the intervention period ($p<0.001$). Compliance to insertion forms and maintenance forms was observed to increase within the intervention period.

Shepherd et al., (2015)[67] conducted a study to describe quality improvement (QI) initiative that was associated with dramatic reduction in neonatal central-line associated bloodstream infection (CLABSI) rate in a diverse group of eight intensive care nurseries (Neonatal Services) The aggregate CLABSI rate decreased to 1.43 CLABSI per 1000 catheter daysfrom 6.0 CLABSI per 1000 catheter days in less than 2 years and has remained in control at 0.68 per 1000 catheter days for more than 5 years. Key success factors included: (1) engagement of senior executive leadership; (2) implementation of chlorhexidine antisepsis and the use of chlorhexidine-impregnated catheter site discs; and (3) and establishment of dedicated team for the PICC insertion to serve units in which central lines are placed less frequently. Using the model for improvement and evidenced-based interventions, this QI project has been associated with a reduction in the CLABSI rate by 89%. In this study catheter care bundle including utilization of chlorhexidine antisepsis techniques, dedicated team of NICU fellows for umbilical line insertion have been implemented leading to decrease in ULABSI.

In the present study better outcome discharge was reported after the implementation of quality improvement initiative in phase II. The results of the study have signified that a significant decline in healthcare-

associated infections (HAIs) is possible by using the principles of quality improvement. This study for blood infection control in NICU resulted in 3.3% reduction in Candida parasilosis while no growth in blood culture was seen in 94.4% subjects. The overall rate of sepsis was reduced from 13.3% to 4.2% cases. The study found out that umbilical catheter tip culture has shown growth of micro-organisms in majority of subjects in both phase I (20%) as compared to 8.5% in phase II subjects. These findings suggest that reduction in rate of line related infections as well as blood stream infections was reported after the implementation of quality improvement initiative in the present study. These findings were consistent with the findings of the previous studies.

In a reference study Balla et al., (2018)[28] reported that the QI initiative achieved 89% reduction in CLABSI from the baseline rate of 31.7 to 3.5 per 1000 line-days. The blood stream Infections decreased to 2.3 from 7.3 per 1000 patient-days. The overall mortality reduced to 1.7 % from 2.9% during the intervention period. There was significant improvement in compliance with hand hygiene protocol and compliance with ULABSI protocols.

Similar findings were reported by Bizzarro et al., (2010).[69] The study reported that overall rate of late-onset sepsis was reduced from 5.84 to 1.42 cases per 1,000 patient-days (rate difference, −4.42 cases per 1,000 patient-days [95% confidence interval, −5.55 to −3.30 cases per 1,000 patient-days]). The rate of CLABSI in the NICU also decreased from 8.40 to 1.28 cases per 1,000 central line–days. Jeong et al., (2021)[59] in their study reported that with a quality improvement initiative, the mean CLABSI incidence rate per 1,000 catheter-days decreased from 6.6 to 3.1 (*P*=0.004).

The study found out that discharge rate increased from 83.3% to 87.3% and the discharge on request rate decreased from 10% to 2.8%. The mortality rate also reduced from 10% in phase I to 7% in phase II.

Balla et al., (2018)[28] in their study reported that the overall mortality between the baseline and intervention period had shown a reduction from 2.9 to 1.7 per 100 admissions. Another study found that quality

improvement projects decrease the incidence of CLABSI, decrease patients' mortality, and reduce hospitalization days.[72] Therefore, such QI initiative should be performed as a routine protocol. To be more successful, care bundle should concentrate on its risk factors. During the catheter insertion, compliance with barrier precautions is desirable to minimize the probability of infections. Staff education and training the staff positively impact the prevalence rate, utilizing maximal sterile obstacle safety measures that include sterile full-body drapes, sterile gloves, sterile gowns, masks, and caps, all central venous catheters are placed.

This study had some challenges and limitations that were encountered while attempting to implement a quality improvement (QI) program. One challenge was maintaining the motivation and engagement of the healthcare professionals (HCPs) involved in the program. To address this, the team shared data at regular meetings, provided feedback, and included personnel from all levels of care. Another challenge was ensuring that all members of the team were familiar with the protocol for preventing central line-associated bloodstream infections (CLABSIs). To address this, the team introduced the protocol to new nurses during their induction, sent emails with information about the protocol, held teaching sessions. One limitation of using a QI approach is that it can be difficult to determine the exact impact of specific interventions on infection rates. Another limitation was a small dataset, particularly due to the study population being restricted to a single NICU facility. However, these limitations did not significantly affect the outcomes of the study. Despite these challenges, the study demonstrated that QI principles can be effective in addressing the issue of nosocomial sepsis in neonatal intensive care units (NICUs).

SUMMERY AND CONCLUSION

This study demonstrates the effectiveness of quality improvement initiative on umbilical line associated blood stream infection in neonatal intensive care unit. Quality improvement initiative has a significant impact on umbilical line associated blood stream infection in neonatal intensive care unit. The study concludes that such QI intervention program has capability to reduce the blood stream infections. However, the challenge remains in strengthening the processes and sustaining the achievements while further exploring new interventions and strategies to further reduce infections.

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Sr. No	MRD No	Name of patient	group	HOSPITAL STAY	PDSA	Age	Age group	Gender	Gest. Age	Time taken	No of days of umbilical line	umbilical line rate	umbilical line days/1000	Diagnosis	Twins	term	Extrem preterm	Early Preterm
1	676559	B/o kirti	2	45	1	1	1	FEMALE	31	10	12	13.75	5.90	Pre term/approriate for gestational/respiratory distrus syndrome/early on set sepsis/long pneumonia/neo netal highperbilirubinomia	N	N	N	N
2	1127202	B/o Jaskirat	2	34	1	1	1	MALE	27	10	11	12.60	5.41	EPT/AGA/ELBW/RDS/RF/ASYMPTOMATIC HYPOGLYCENIA	N	N	N	Y
3	1131477	B/o Poonam	2	35	1	1	1	MALE	31	15	6	6.87	2.95	PT/AGA/RDS/APOP/NNH (premature)	N	N	N	N
4	1133499	B/o Deeksha	2	12	1	1	1	FEMALE	27	15	6	6.87	2.95	EPT/ AGA/ RF/ RDS/ APDP/ VLBW	N	N	N	Y
5	1133508	B/o Mandeep	2	13	1	1	1	MALE	30	15	7	8.02	3.44	EPT/ AGA/ NNH/RH -VE pregnancy	N	N	N	Y
6	1133509	B/o Mandeep 2	2	8	1	1	1	MALE	30	15	9	10.31	4.43	EPT/AGA/RDS/ELBW/RF/TLP/ABN / SHOCK	N	N	N	Y
7	1133564	B/o Rajni	2	21	1	1	1	MALE	31	6	8	9.16	3.94	EPT/AGA/ULBW/RDS/LONG PNEUMONIA	N	N	N	Y
8	1135274	B/o Shalu	2	8	1	4	2	FEMALE	36	15	8	9.16	3.94	LPT/AGA/RF/SEIZERS/SEPSIS/PIEN	N	N	N	N
9	1110544	B/o Inderpreet	2	7	1	1	1	FEMALE	26	8	6	6.87	2.95	EPT/AGA/ELWB/RF/RDS/OS/NEC/TCP	N	N	N	Y
10	1135131	B/o Hardeep	2	24	1	1	1	MALE	30	10	12	13.75	5.90	PT/AGA/RDS/RF/PNA/SHOCK/POST CPR SURVIVOR	N	N	N	N
11	1138172	B/o Ritika 2	2	15	1	1	1	MALE	32	11	13	14.89	6.39	PT/AGA/RF/PNA/NNH	N	N	N	N
12	1138858	B/o Gurpreet	2	8	1	1	1	MALE	30	10	8	9.16	3.94	EPT/AGA/RDS/RF/Shock/PNA/NNH/Ab n doppler	N	N	N	Y
13	1138187	B/o Gagandeep	2	7	1	3	2	FEMALE	35	15	7	8.02	3.44	-	N	N	N	N
14	1141812	B/o Sumanpreet	2	7	1	1	1	MALE	28	10	7	8.02	3.44	EXPT/AGA/RDS/RF/Shock /NNH/Staph skin infection	N	N	Y	N
15	1147033	B/o Kirandeep Kaur-1	2	6	2	1	1	MALE	29	15	5	5.73	2.46	PT/AGA/RDS/VLB	N	N	N	N
16	1147037	B/o Kirandeep Kaur-2	2	11	2	1	1	FEMALE	29	10	10	11.45	4.92	PT/AGA/RDS/RF/PNA/SHOCK/POST CPR SURVIVOR	N	N	N	N
17	1146250	B/o Asheema	2	8	2	1	1	MALE	32	15	4	4.58	1.97	PT/AGA/RDS/2BW/Ab n doppler /shock/Brady cardic	N	N	N	N
18	1146262	B/o Prabhjot	2	32	2	1	1	FEMALE	28	25	5	5.73	2.46	PT/AGA/VLBW/RDS	N	N	N	N
19	1146877	B/o Prabhdeep	2	17	2	1	1	MALE	30	10	15	17.18	7.38	PT/AGA/RDS	N	N	N	N
20	1143338	B/o Esha	2	10	2	1	1	MALE	30	15	6	6.87	2.95	PT/AGA/Severe RDS/ Resp distress/LBW	N	N	N	N
21	1144922	B/o Rajni Bala	2	25	2	1	1	MALE	28	10	6	6.87	2.95	EPT/AGA/RDS	N	N	N	Y
22	1149901	B/o Sonia Kapoor	2	11	2	1	1	MALE	35	15	15	17.18	7.38	LPT/AGA/RDS/Long pmeumonia /RF	N	N	N	N
23	1147179	B/o Mandeep Kaur	2	37	2	1	1	MALE	26	12	7	8.02	3.44	EPT/AGA/Severe RDS/RF/NNH/RH -ve pregnancy	N	N	N	Y
24	1149073	B/o Arshdeep Kaur	2	25	2	1	1	MALE	39	11	7	8.02	3.44	EPT/AGA/RF/PNA/HIE(Stage 2)	N	N	N	Y
25	1150004	B/o Surbhi	2	27	2	1	1	MALE	31	13	7	8.02	3.44	PT/AGA/RDS/RF/PNA/SHOCK/POST CPR SURVIVOR	N	N	N	N
26	1199751	B/o Balbir 2	2	49	3	1	1	FEMALE	28	9	14	16.04	6.89	PT/AGA/LBW/RF/RDS	N	N	N	N
27	1227523	B/O Rohini	2	18	4	1	1	FEMALE	31	10	5	5.73	2.46	PT/AGA/VLBW/PNA/RDS/ Asympyomatic Hypoglycemia	N	N	N	N
28	1149916	B/O Surbhi Sharma	2	27	3	1	1	MALE	31	8	7	8.02	3.44	PT/AGA/VLBW/RDS	N	N	N	N
29	1166221	B/O Rajni	2	64	4	1	1	FEMALE	26	9	10	11.45	4.92	EXPT/AGA/RDS/RF	N	N	Y	Y
30	1166108	B/o Bhawna	2	10	3	1	1	FEMALE	37	11	7	8.02	3.44	T/ AGA/ Severe MAS/ RF/ Shock	N	Y	N	N
31	1166927	B/O Manjot twin 2	2	3	3	1	1	MALE	27	12	4	4.58	1.97	PT/AGA/RDS/RF	N	N	N	N

Sr. No	MRD No	Late Preterm	Appropiate for gestational	SGA	LGA	LBW	ELBW	VLBW	Respiratory Failure	Respiratory distress syndrome	Early onset sepsis	PPHN	Cong pneumonia	Neonatal hyperbilirubinemia	Seizures	Sepsis	Staph skin infection	PNA	Shock	Asympomatic Polycythemia	Asymptomatic hypoglycemoia	Anemia of prematurity
1	676559	Y	Y	N	N	N	N	N	N	Y	Y	N	Y	Y	N	N	N	N	N	N	N	N
2	1127202	N	Y	N	N	N	Y	N	Y	Y	N	N	N	N	N	N	N	N	N	N	Y	N
3	1131477	Y	Y	N	N	N	N	N	N	Y	N	N	N	Y	N	N	N	N	N	N	N	N
4	1133499	N	Y	N	N	N	N	Y	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N
5	1133508	N	Y	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	N
6	1133509	N	Y	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N
7	1133564	N	Y	N	N	N	N	Y	N	Y	N	N	Y	N	N	N	N	N	N	N	N	N
8	1135274	Y	Y	N	N	N	N	N	Y	N	N	N	N	N	Y	Y	N	N	N	N	N	N
9	1110544	N	Y	N	N	N	Y	N	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N
10	1135131	Y	Y	N	N	N	N	N	Y	Y	N	N	N	N	N	N	N	Y	Y	N	N	N
11	1138172	Y	Y	N	N	N	N	N	Y	N	N	N	N	Y	N	N	N	Y	N	N	N	N
12	1138858	N	Y	N	N	N	N	N	Y	Y	N	N	N	Y	N	N	N	Y	Y	N	N	N
13	1138187	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
14	1141812	N	Y	N	N	N	N	N	Y	Y	N	N	N	Y	N	N	Y	N	Y	N	N	N
15	1147033	Y	Y	N	N	N	N	Y	N	Y	N	N	N	N	N	N	N	N	N	N	N	N
16	1147037	Y	Y	N	N	N	N	N	Y	Y	N	N	N	N	N	N	N	Y	Y	N	N	N
17	1146250	Y	Y	N	N	Y	N	N	N	Y	N	N	N	N	N	N	N	N	Y	N	N	N
18	1146262	Y	Y	N	N	N	N	Y	N	Y	N	N	N	N	N	N	N	N	N	N	N	N
19	1146877	Y	Y	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N
20	1143338	Y	Y	N	N	Y	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N
21	1144922	N	Y	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N
22	1149901	Y	Y	N	N	N	N	N	Y	Y	N	N	Y	N	N	N	N	N	N	N	N	N
23	1147179	N	Y	N	N	N	N	N	Y	Y	N	N	N	Y	N	N	N	N	N	N	N	N
24	1149073	N	Y	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	Y	N	N	N	N
25	1150004	Y	Y	N	N	N	N	N	Y	Y	N	N	N	N	N	N	N	Y	Y	N	N	N
26	1199751	Y	Y	N	N	Y	N	N	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N
27	1227523	Y	Y	N	N	N	N	Y	N	Y	N	N	N	N	N	N	N	Y	N	N	Y	N
28	1149916	Y	Y	N	N	Y	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N
29	1166221	N	Y	N	N	N	N	N	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N
30	1166108	N	Y	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	Y	N	N	N
31	1166927	Y	Y	N	N	N	N	N	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N

Sr. No	MRD No	Apnea of Prematurity	Oedema of Prematurity	Hyponatremia of prematurity	Metabolic Bone disease	Meconium aspiration syndrome	LOS	NEC	TCP	HIE	Abnormal doppler	Bradycardia	RH isoimmunization	RH-IVE PREGNANCY	CONGENITAL HEART BLOCK	MYOCARDITIS	NEONATAL MIS-N	Pst CPR surviovor
1	676559	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
2	1127202	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
3	1131477	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
4	1133499	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
5	1133508	N	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N
6	1133509	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
7	1133564	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
8	1135274	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
9	1110544	N	N	N	N	N	Y	Y	Y	N	N	N	N	N	N	N	N	N
10	1135131	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y
11	1138172	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
12	1138858	N	N	N	N	N	N	N	N	N	Y	N	N	N	N	N	N	N
13	1138187	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
14	1141812	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
15	1147033	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
16	1147037	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y
17	1146250	N	N	N	N	N	N	N	N	N	Y	Y	N	N	N	N	N	Y
18	1146262	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
19	1146877	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
20	1143338	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
21	1144922	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
22	1149901	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
23	1147179	N	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N
24	1149073	N	N	N	N	N	N	N	N	Y(hie3)	N	N	N	N	N	N	N	N
25	1150004	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y
26	1199751	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
27	1227523	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
28	1149916	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
29	1166221	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
30	1166108	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N
31	1166927	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

Sr. No	MRD No	Umbilical line inserted by	Indication of insertion of umbilical line	Antenatal problems	Type of delivery	Asphyxia	Cry	Feeding	Period of mechanical ventilation	ROP	BPD	WEIGHT	HEIGHT	HC	HB	TCL
1	676559	Fellow	premature	thrombo cypo penia , retroplacentral clot	LSCS	NO	immediate	Expressed breast milk	NO	-	-	2020	45	30	15.6	14.2
2	1127202	Fellow	Prematurity, mechanical ventilation	Hypothyroidim , gest , htn. Oligohydromnia.	LSCS under SA	YES	No	Expressed breast milk	NO	Highly immature retina , TVL(+),Hczy view no PPD	-	660	32	23	16.1	12.7
3	1131477	Fellow	premature	single loop of cord / PTLP's	NVD	NO	immediate	Expressed breast milk	NO	-	-	2640	46	29.5	16.5	12
4	1133499	Fellow	Prematurity, mechanical ventilation	PTLP'S , PPROM, Small fibroidon lateral wall oligphy	LSCS under SA	NO	immediate	Expressed breast milk	NO	-	-	1020	30	26	13.7	36.9
5	1133508	Fellow	-	Gest HTN	LSCS under SA	YES	NO	Expressed breast milk	NO	-	-	1280	30	24	15.9	15.1
6	1133509	Fellow	prematurity, mechanical ventilation, inotopic support	-	LSCS under SA	YES	NO	Expressed breast milk	4	-	-	980	32	25	13.5	15.7
7	1133564	Fellow	premature	HTN,LPV ,PTPL	LSCS	NO	immediate	Expressed breast milk	NO	-	-	1380	34	28	19.6	14.6
8	1135274	Fellow	-	PIH	LSCS under SA	NO	immediate	Expressed breast milk	4	N	-	1700	31	43	16.6	11.8
9	1110544	Fellow	prematurity, mechanical ventilation, inotopic support	UTI,CRP=47 +,RPC	LSCS under GA	YES	NO	Expressed breast milk	NO	Zone 2 stage 1, no pre plu disease	-	820	35	23.5	9.2	15.4
10	1135131	Fellow	Premature,Inotropic support	pre-eclamps sever features	LSCS	YES	NO	Expressed breast milk	7	N	-	1625	44	28	13.7	13.9
11	1138172	Fellow	Premature, BP Monitoring	ptlp's,icp,tcp, anemia	LSCS under GA	YES	NO	Expressed breast milk	NO	-	-	1665	48	32	17.3	7.8
12	1138858	Fellow	Premature,Inotropic support	PE,Ab n doppler (absent flow), Mechanical	LSCS under SA	YES	NO	Expressed breast milk	8	-	-	790	38	27	17.6	9.4
13	1138187	Fellow	premature	PTLP'S,RH-VE Pregnancy	LSCS under SA	NO	immediate	Expressed breast milk	NO	Zone 3 immature , no pre plus disease	-	1730	46	32	14.5	21.5
14	1141812	Fellow	Premature,Inotropic support	Poxoplasma Igm+ve, ptlp's, pprom	LSCS under SA	NO	immediate	Expressed breast milk	7	-	-	1020	37	25	15.8	15.2
15	1147033	Fellow	premature	ptlp's,s/c Hypothyriod, UTI, Anemia (9.5)	LSCS under SA	NO	immediate	Expressed breast milk	NO	-	-	1180	-	-	14.8	14.6
16	1147037	Fellow	premature	PTLP,S/C Hypothymia ,UTI	LSCS under SA	NO	immediate	Expressed breast milk	NO	-	-	1380	39	30	16.2	14.9
17	1146250	Fellow	premature	GDMA/TCP/Abndoppler/FGR2	LSCS under SA	NO	immediate	Expressed breast milk	NO	-	-	1600	32	27	15.6	8.3
18	1146262	Fellow	premature	pprom, breech, cord boloph	LSCS under GA	NO	immediate	Expressed breast milk	NO	-	-	1420	30	25	14.9	27.5
19	1146877	Fellow	premature	pprom,oligohydramnios	LSCS under SA	NO	immediate	Expressed breast milk	NO	-	-	1580	40	29	16.3	8.3
20	1143338	Fellow	premature	fetal movements , IVH in fetal scan	LSCS under SA	NO	immediate	Expressed breast milk	NO	-	-	1580	40	31	16.3	19.8
21	1144922	Fellow	Prematurity, mechanical ventilation	PPROM,Sepses,anhydramnios	LSCS under SA	YES	immediate	Expressed breast milk	NO	-	-	1280	44	26	14.7	38.2
22	1149901	Fellow	premature	H/O APH, Placenta	LSCS under GA	NO	immediate	Expressed breast milk	7	-	-	2320	36	26	15.8	14.2
23	1147179	Fellow	prematurity, mechanical ventilation, inotopic support	PPROM, PTLPS/RH-VE Choriomni units	LSCS under SA	NO	immediate	Expressed breast milk	NO	-	-	1205	32	27	15.3	51.3
24	1149073	Fellow	mechanical ventilation	-	Vaginal delivery	YES	NO	Expressed breast milk	4	-	-	3300	34	28	17	14.6
25	1150004	Fellow	premature	DA/DC,Mc	Vaginal delivery	YES	NO	Expressed breast milk	4	-	-	1280	-	-	17.6	24
26	1199751	Fellow	prematurity, mechanical ventilation, inotopic support	CHRONIC HTN, OVERT HYPOTHYROIDISM	LSCS under SA	NO	immediate	EBM	6	-	-	915	37	26	18.4	16.3
27	1227523	Fellow	prematurity	Gest HTN, breech presentation	LSCS under SA	NO	delayed	EBM	NO	normal limits	NO	1450	40	28	18.2	8.1
28	1149916	Fellow	prematurity	DA/DC twins, one of the riplets died	Vaginal delivery	NO	immediate	EBM	NO	normal limits	NO	1260	38	27	18	10.5
29	1166221	Fellow	prematurity	subchorionic hematoma, PTLPs, funneling of cervix	Vaginal delivery	NO	immediate	EBM	6	zone 1 stage 1 , no preplus disease	NO	980	32	26	15.7	16.6
30	1166108	Fellow	inotropic suport	Anhydramnios	LSCS under GA	NO	immediate	EBM	5	-	NO	2900	50	34	19.8	20.5
31	1166927	Fellow	Prematurity, mechanical ventilation	LPV X 24 hours, PTLP X 12 hours	LSCS under SA	NO	immediate	EBM	4	zone 1 stage 1 , no preplus disease	NO	1320	38	27	13.8	13

Sr. No	MRD No	Platelet	CRP	PCT	Blood culture	Umbilical catheter tip culture	HAND WASH Done	HAND WASH Done After Reminder	HAND WASH Adequate time for hand hygiene	Heparin connected to umbilical artery line	Periodical checks for local sighs of inflammationswelling	Watch for lower limb colour and perfusion	Assemble equipment/verify supplies	Done After Reminder	Inform Radiology
1	676559	699	21.02	-	No growth	No growth	YES	NO	YES	YES	YES	YES	YES	-	YES
2	1127202	150	0.59	-	No growth	No growth	YES	NO	YES	YES	YES	YES	YES	-	YES
3	1131477	295	0.25	-	No growth	No growth	YES	NO	YES	YES	YES	YES	YES	-	YES
4	1133499	259	20.41	-	No growth	No growth	YES	NO	YES	YES	YES	YES	YES	-	YES
5	1133508	473	0.69	-	No growth	No growth	YES	NO	YES	YES	YES	YES	YES	-	YES
6	1133509	248	29.82	-	No growth	No growth	NO	YES	NO	YES	YES	YES	YES	-	YES
7	1133564	442	3.2	-	No growth	No growth	YES	NO	YES	YES	YES	YES	YES	-	YES
8	1135274	244	11	-	E.Coli	psuedonionas sp	NO	YES	YES	YES	YES	YES	YES	-	YES
9	1110544	916	0.34	-	No growth	No growth	YES	NO	YES	YES	YES	YES	YES	-	YES
10	1135131	223	1.03	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
11	1138172	198	0.39	-	No growth	staph aureus++	NO	YES	NO	YES	YES	YES	YES	-	YES
12	1138858	308	1.3	-	No growth	Enterococcus feacium	YES	NO	YES	YES	YES	YES	YES	-	YES
13	1138187	393	7.63	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
14	1141812	299	2	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
15	1147033	356	2.32	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
16	1147037	608	0.59	-	No growth	Psuedomones +++	NO	YES	YES	YES	YES	YES	YES	-	YES
17	1146250	212	0.64	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
18	1146262	416	2.55	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
19	1146877	130	0.78	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
20	1143338	471	0.4	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
21	1144922	469	4.28	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
22	1149901	381	1.42	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
23	1147179	244	16.71	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
24	1149073	373	23.62	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
25	1150004	295	2.16	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
26	1199751	504	0.27	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
27	1227523	218	1.64	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
28	1149916	402	1.18	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
29	1166221	272	11.54	-	No growth	NO GROWTH	YES	NO	YES	YES	YES	YES	YES	-	YES
30	1166108	240	158.3	-	No growth	Acinetobacter Baumanii+++	YES	NO	NO	YES	YES	YES	YES	-	YES
31	1166927	230	0.2	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES

Sr. No	MRD No	Done After Reminder	Assess, cleanse the site	Done After Reminder	Position patient correctly for procedure	Done After Reminder	Wear sterile gown and gloves	Done After Reminder	Drape a large area exposing ONLY site	Done After Reminder	Prepare site with 2% chlorhexidine/4% alcohol solution	Done After Reminder	Prepare site for 30 seconds	Done After Reminder	Dry for up to 60 seconds without fanning/wiping	Done After Reminder
1	676559	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
2	1127202	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
3	1131477	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
4	1133499	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
5	1133508	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
6	1133509	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
7	1133564	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
8	1135274	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
9	1110544	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
10	1135131	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
11	1138172	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
12	1138858	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
13	1138187	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
14	1141812	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
15	1147033	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
16	1147037	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
17	1146250	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
18	1146262	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
19	1146877	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
20	1143338	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
21	1144922	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
22	1149901	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
23	1147179	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
24	1149073	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
25	1150004	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
26	1199751	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
27	1227523	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
28	1149916	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
29	1166221	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
30	1166108	-	YES	-	YES	-	-	-	YES	-	YES	-	YES	-	YES	-
31	1166927	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-

Sr. No	MRD No	Maintain sterile field throughout procedure	Done After Reminder	Did the assistant follow the same precautions? (Hand washing, mask, gloves and gown)	Done After Reminder (Hand washing, mask, gloves and gown)	Was sterility maintained when applying dressing/ stitches?	Done After Reminder	Was sterile field compromised during line readjustment?	Done After Reminder sterile field	Were IV fluids/lines being attached aseptically?	Done After Reminder IV fluids/line
1	676559	YES	-	YES	-	YES	-	NO	-	YES	-
2	1127202	YES	-	YES	-	YES	-	NO	-	YES	-
3	1131477	YES	-	YES	-	YES	-	NO	-	YES	-
4	1133499	YES	-	YES	-	YES	-	YES	YES	YES	-
5	1133508	YES	-	YES	-	YES	-	NO	-	YES	-
6	1133509	YES	-	NO	YES	YES	-	NO	-	YES	-
7	1133564	YES	-	YES	-	YES	-	YES	YES	YES	-
8	1135274	NO	YES	YES	-	YES	-	NO	-	YES	-
9	1110544	YES	-	YES	-	YES	-	YES	YES	YES	-
10	1135131	YES	-	YES	-	YES	-	NO	-	YES	-
11	1138172	NO	YES	YES	-	YES	-	YES	YES	YES	-
12	1138858	YES	-	YES	-	YES	-	YES	YES	YES	-
13	1138187	YES	-	YES	-	YES	-	NO	-	YES	-
14	1141812	NO	YES	YES	-	YES	-	NO	-	YES	-
15	1147033	YES	-	YES	-	YES	-	NO	-	YES	-
16	1147037	NO	YES	NO	YES	YES	-	NO	-	YES	-
17	1146250	YES	-	YES	-	YES	-	NO	-	YES	-
18	1146262	YES	-	YES	-	YES	-	NO	-	YES	-
19	1146877	YES	-	YES	-	YES	-	NO	-	YES	-
20	1143338	YES	-	YES	-	YES	-	NO	-	YES	-
21	1144922	YES	-	YES	-	YES	-	YES	YES	YES	-
22	1149901	YES	-	YES	-	YES	-	YES	YES	YES	-
23	1147179	YES	-	YES	-	YES	-	NO	-	YES	-
24	1149073	YES	-	NO	YES	YES	-	NO	-	YES	-
25	1150004	YES	-	YES	-	YES	-	NO	-	YES	-
26	1199751	YES	-	YES	-	YES	-	NO	-	YES	-
27	1227523	YES	-	YES	-	YES	-	NO	-	YES	-
28	1149916	YES	-	YES	-	YES	-	NO	-	YES	-
29	1166221	YES	-	YES	-	YES	-	YES	YES	YES	-
30	1166108	YES	-	NO	YES	YES	-	YES	YES	YES	-
31	1166927	YES	-	YES	-	YES	-	NO	-	YES	-

Sr. No	MRD No	Is the umbilical line dressing changed routinely?	Done After Reminder umbilical line dressing	TOP SHELF_Sterile Towels	Sterile Gowns	Caps (in plastic bag)	Masks	UAC Trays	BOTTOM SHELF_#6 Fr. Single Lumen Umbilical line	#5 Fr. Single Lumen Umbilical line	#3.5 Fr. Single Lumen Umbilical line	#3 Fr, Single Lumen Umbilical line	DRAWERS_Sterile Gloves	Measuring Tape
1	676559	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
2	1127202	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
3	1131477	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
4	1133499	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
5	1133508	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
6	1133509	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
7	1133564	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
8	1135274	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
9	1110544	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
10	1135131	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
11	1138172	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
12	1138858	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
13	1138187	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
14	1141812	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
15	1147033	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
16	1147037	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
17	1146250	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
18	1146262	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
19	1146877	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
20	1143338	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
21	1144922	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
22	1149901	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
23	1147179	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
24	1149073	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
25	1150004	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
26	1199751	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
27	1227523	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
28	1149916	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
29	1166221	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
30	1166108	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
31	1166927	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Sr. No	MRD No	0.9% NaCl Vial	0.9% NaCl Pre-filled Syringe Package	5mL Syringe	10mL Syringe	Needles (22G, 27G)	Catheter Introducer (22G, 24G)	4”x4” Gauze	2”x2” Gauze	#3.0 Silk Suture	Sterile Scissors and Tweezers set	IV Extension Set	Tegaderm small (4.4cm x 4.4cm)	Tegaderm medium (6cm x 7cm)	Tegaderm large (10cm x 12cm)
1	676559	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
2	1127202	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
3	1131477	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
4	1133499	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
5	1133508	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
6	1133509	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
7	1133564	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
8	1135274	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
9	1110544	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
10	1135131	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
11	1138172	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
12	1138858	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
13	1138187	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
14	1141812	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
15	1147033	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
16	1147037	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
17	1146250	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
18	1146262	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
19	1146877	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
20	1143338	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
21	1144922	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
22	1149901	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
23	1147179	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
24	1149073	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
25	1150004	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
26	1199751	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
27	1227523	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
28	1149916	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
29	1166221	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
30	1166108	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
31	1166927	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Sr. No	MRD No	Clamps, non-tooth, non-sterile	Alcohol for cleaning cart top	Tapes	OUTCOME Discharge	• Proper size of catheter inserted	• Back flow checked	washinh hands prior to touching the line	closed system	is the line being placed away from potential areas of contamination	scrubbing up and down on the IV tubing and line?	Does the nurse wait for the port to dry after swabbing before accessing?	umbilical line dressing changed routinely
1	676559	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
2	1127202	YES	YES	YES	DOR	YES	YES	YES	YES	YES	YES	YES	YES
3	1131477	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
4	1133499	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
5	1133508	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
6	1133509	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
7	1133564	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
8	1135274	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
9	1110544	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
10	1135131	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
11	1138172	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
12	1138858	YES	YES	YES	DAMA	YES	YES	YES	YES	YES	YES	YES	YES
13	1138187	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
14	1141812	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
15	1147033	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
16	1147037	YES	YES	YES	DEATH	YES	YES	YES	YES	YES	YES	YES	YES
17	1146250	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
18	1146262	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
19	1146877	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
20	1143338	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
21	1144922	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
22	1149901	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
23	1147179	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
24	1149073	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
25	1150004	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
26	1199751	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
27	1227523	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
28	1149916	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
29	1166221	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
30	1166108	YES	YES	YES	DAMA	YES	YES	YES	YES	YES	YES	YES	YES
31	1166927	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES

Sr. No	MRD No	Name of patient	group	HOSPITAL STAY	PDSA	Age	Age group	Gender	Gest. Age	Time taken	No of days of umbilical line	umbilical line rate	umbilical line days/1000	Diagnosis	Twins	term	Extrem preterm	Early Preterm
32	1166926	B/O Manjot twin1	2	3	3	1	1	FEMALE	27	10	3	3.44	1.48	PT/AGA/VLBW/RDS/RF	N	N	N	N
33	1166942	Jasjot Singh	2	16	3	7	2	MALE	37	15	7	8.02	3.44	T/AGA/LOS/AKI/Neonatal Seizures	Y	Y	N	N
34	1167745	B/O Sonam	2	45	3	1	1	MALE	24	7	10	11.45	4.92	ExPT/AGA/Severe RDS/ RF/ELBW/NNH/RH-ve pregnancy	N	N	Y	N
35	1169931	B/O Monika	2	2	3	1	1	FEMALE	30	10	12	13.75	5.90	Expt/SGA/ RF	N	N	Y	N
36	1166725	B/O Rajni Thakarwal	2	33	3	1	1	MALE	31	10	6	6.87	2.95	EPT/AGA/Metabolic disease/ Shock/ Myocarditis/ Nenonatal MISC	N	N	N	Y
37	1166909	Avneet Kaur	2	8	3	1	1	FEMALE	36	15	5	5.73	2.46	LPT/AGA/ RDS/RF	N	N	N	N
38	1175763	B/O Sujata	2	68	3	1	1	MALE	28	10	7	8.02	3.44	PT/AGA/ELBW/RDS/RD/NEC-I	N	N	N	N
39	1180510	B/o Amandeep	2	14	3	1	1	MALE	39	12	6	6.87	2.95	T/SGA? Congenital pneumonia/ respiratory failure	N	Y	N	N
40	1180480	B/O Priya	2	29	3	2	2	FEMALE	37	10	12	13.75	5.90	T/AGA/ Congenoital Pneumonia/ PPHN/ Shock/ PDA	N	Y	N	N
41	1183296	B/o Kanika	2	13	3	2	2	MALE	35	15	5	5.73	2.46	LPT/ SGA/ second of twins/ RDS	Y	N	N	N
42	1185329	B/O Savita	2	35	3	1	1	FEMALE	29	10	5	5.73	2.46	PT/SGA/ RF/ ELBW/NNH	N	N	N	N
43	1215980	B/o Ramandeep 2	2	41	4	1	1	FEMALE	28	15	9	10.31	4.43	Pt/AGA/ VLBW/RF/RDS/NEC/APOP/Anop	N	N	N	N
44	1215979	B/o Ramandeep 1	2	41	4	1	1	FEMALE	28	8	8	9.16	3.94	PT/AGA/RDS/RF/ELBW/NNH	N	N	N	N
45	1213600	B/o Akashdeep 1	2	33	4	1	1	MALE	29	7	7	8.02	3.44	PT/AGA/RDS/RF/VLBW/TWIN-1	Y	N	N	N
46	1217682	B/O sonam Kumari 2	2	45	4	1	1	FEMALE	32	10	6	6.87	2.95	PT/AGA/RDS/RF/NNH	N	N	N	N
47	1217681	B/O sonam Kumari 1	2	64	4	1	1	FEMALE	32	20	6	6.87	2.95	PT/SGA/RF/RDS/APOP/ANOP/HYPONATREMIA OF PREMATURITY/ NNH/LOS	N	N	N	N
48	1228655	B/o Kamlesh Rani	2	23	4	1	1	MALE	28	10	10	11.45	4.92	PT/AGA/RDS/RF/SHOCK/RIGHT PNEUMOTHORAX/NEC/PPHN	N	N	N	N
49	1220206	B/O Santosh Rani	2	27	4	1	1	FEMALE	29	10	8	9.16	3.94	PT/AGA/RDS/RF/PNA/NNH	N	N	N	N
50	1228671	B/o Devangna	2	24	4	1	1	FEMALE	31	25	7	8.02	3.44	PT/AGA/VLBW/NEC/SHOCK/NNH/ BLOOD CULTURE POSITIVE FOR BURKHOLDERIA CEPACIA	N	N	N	N
51	1229711	B/O Nitika 2	2	23	4	1	1	FEMALE	32	15	8	9.16	3.94	PT/SGA/RDS/LBW/NNH	N	N	N	N
52	1229710	B/O Nitika1	2	17	4	1	1	FEMALE	32	12	9	10.31	4.43	PT/AGA/RDS/LBW/NNH	N	N	N	N
53	1228196	Gagan Mehta	2	24	4	3	2	MALE	37	10	10	11.45	4.92	T/SGA/RF/NNH/ADVACNED NEC/POLYCYTHEMIA/COAGULOPATHY/SEIZURES	N	Y	N	N
54	1244464	B/O Manpreet	2	18	4	1	1	MALE	38	15	8	9.16	3.94	T/SGA/MAS/PPHN/SHOCK/EOS/POOR CARDIAC CONTRACTILITY	N	Y	N	N
55	1245492	B/O Amandeep	2	24	4	1	1	FEMALE	36	10	11	12.60	5.41	LPT/AGA/EOS/RF/PNEUMOTHORAX RIGHT/ SHCK/NNH/HYPOCALCEMIA	N	N	N	N
56	1244972	B/O Baljit-1	2	32	4	1	1	FEMALE	24	12	8	9.16	3.94	EPT/ELBW/SEVERE RDS/RF/RH -VE PREGNANCY/SHOCK	N	N	N	Y
57	1244580	B/O Pradeep	2	14	4	1	1	MALE	30	10	7	8.02	3.44	PT/AGA/RDS/RF/RH ISOIMMUNIZATION/NNH	N	N	N	N
58	1245636	B/o Kajal	2	7	4	1	1	FEMALE	33	10	7	8.02	3.44	PT/AGA/RDS/RF/NNH/SHOCK	N	N	N	N
59	1247642	B/o Kajal	2	21	4	1	1	MALE	30	10	8	9.16	3.94	PT/AGA/RDS/RF/APOP/NNH	N	N	N	N
60	1248935	B/O Preeti	2	34	4	1	1	MALE	29	8	9	10.31	4.43	LPT/AGA/RDS/RF/NNH	N	N	N	N
61	1251682	B/O Lata Rani	2	8	4	1	1	MALE	28	12	6	6.87	2.95	PT/AGA/RDS/VLBW	N	N	N	N
62	1253075	B/O Gurjit Kaur	2	6	4	1	1	MALE	34	10	6	6.87	2.95	PT/AGA/RDS/RF/CONGENITAL HEART BLOCK	N	N	N	N
63	1253173	B/o Karamjeet 2	2	24	4	1	1	FEMALE	31	11	7	8.02	3.44	PT/AGA/LBW/RDS/RF/NNH	N	N	N	N
64	1251306	B/O Rajveer Kaur	2	16	4	1	1	FEMALE	32	10	10	11.45	4.92	PT/AGA/NNH/RH ISOIMMUNIZATION/ SEVDERE RDS	N	N	N	N

Sr. No	MRD No	Late Preterm	Appropiate for gestational	SGA	LGA	LBW	ELBW	VLBW	Respiratory Failure	Respiratory distress syndrome	Early onset sepsis	PPHN	Cong pneumonia	Neonatal hyperbilirubinemia	Seizures	Sepsis	Staph skin infection	PNA	Shock	Asympomatic Polycythemia	Asymptomatic hypoglycemoia	Anemia of prematurity
32	1166926	Y	Y	N	N	N	N	Y	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N
33	1166942	N	Y	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N	N	N	N
34	1167745	N	Y	N	N	N	Y	N	Y	Y	N	N	N	Y	N	N	N	N	N	N	N	N
35	1169931	N	N	Y	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N
36	1166725	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	N
37	1166909	Y	Y	N	N	N	N	N	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N
38	1175763	Y	Y	N	N	N	Y	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N
39	1180510	N	N	Y	N	N	N	N	Y	N	N	N	Y	N	N	N	N	N	N	N	N	N
40	1180480	N	Y	N	N	N	N	N	N	N	N	Y	Y	N	N	N	N	N	Y	N	N	N
41	1183296	Y	N	Y	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N
42	1185329	Y	N	Y	N	N	Y	N	Y	N	N	N	N	Y	N	N	N	N	N	N	N	N
43	1215980	Y	Y	N	N	N	N	Y	Y	Y	N	N	N	N	N	N	N	N	N	N	N	Y
44	1215979	Y	Y	N	N	N	Y	N	Y	Y	N	N	N	Y	N	N	N	N	N	N	N	N
45	1213600	Y	Y	N	N	N	N	Y	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N
46	1217682	Y	Y	N	N	N	N	N	Y	Y	N	N	N	Y	N	N	N	N	N	N	N	N
47	1217681	Y	N	Y	N	N	N	N	Y	Y	N	N	N	Y	N	N	N	N	N	N	N	Y
48	1228655	Y	Y	N	N	N	N	N	Y	Y	N	Y	Y	Y	N	N	N	N	Y	N	N	N
49	1220206	Y	Y	N	N	N	N	N	Y	Y	N	N	N	Y	N	N	N	Y	N	N	N	N
50	1228671	Y	Y	N	N	N	N	Y	N	N	N	N	N	Y	N	Y	N	N	Y	N	N	N
51	1229711	Y	N	Y	Y	N	N	N	N	Y	N	N	N	Y	N	N	N	N	N	N	N	N
52	1229710	Y	Y	N	Y	N	N	N	N	Y	N	N	N	Y	N	N	N	N	N	N	N	N
53	1228196	N	N	Y	N	N	N	N	Y	N	N	N	N	Y	Y	N	N	Y	N	Y	N	N
54	1244464	N	N	Y	N	N	N	N	N	N	Y	Y	N	Y	N	N	N	Y	Y	N	N	N
55	1245492	Y	Y	N	N	N	N	N	Y	Y	Y	N	N	Y	N	N	N	N	Y	N	N	N
56	1244972	N	N	N	N	N	Y	N	Y	Y	N	N	N	N	N	N	N	N	Y	N	N	N
57	1244580	Y	Y	N	N	N	N	N	Y	Y	N	N	N	Y	N	N	N	N	N	N	N	N
58	1245636	Y	Y	N	N	N	N	N	Y	Y	N	N	N	Y	N	N	N	N	Y	N	N	N
59	1247642	Y	Y	N	N	N	N	N	Y	Y	N	N	N	Y	N	N	N	N	N	N	N	N
60	1248935	Y	Y	N	N	N	N	N	Y	Y	N	N	N	Y	N	N	N	N	N	N	N	N
61	1251682	Y	Y	N	N	N	N	Y	N	Y	N	N	N	N	N	N	N	N	N	N	N	N
62	1253075	Y	Y	N	N	N	N	N	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N
63	1253173	Y	Y	N	N	Y	N	N	Y	Y	N	N	N	Y	N	N	N	N	N	N	N	N
64	1251306	Y	Y	N	N	N	N	N	N	Y	N	N	N	Y	N	N	N	N	N	N	N	N

Sr. No	MRD No	Apnea of Prematurity	Oedema of Prematurity	Hyponatremia of prematurity	Metabolic Bone disease	Meconium aspiration syndrome	LOS	NEC	TCP	HIE	Abnormal doppler	Bradycardia	RH isoimmunization	RH-IVE PREGNANCY	CONGENITAL HEART BLOCK	MYOCARDITIS	NEONATAL MIS-N	Pst CPR surviovor
32	1166926	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
33	1166942	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
34	1167745	N	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N
35	1169931	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
36	1166725	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	Y	Y	N
37	1166909	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
38	1175763	N	N	N	N	N	N	Y (nec-1)	N	N	N	N	N	N	N	N	N	N
39	1180510	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
40	1180480	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
41	1183296	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
42	1185329	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
43	1215980	Y	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N
44	1215979	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
45	1213600	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
46	1217682	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
47	1217681	Y	N	Y	N	N	Y	N	N	N	N	N	N	N	N	N	N	N
48	1228655	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N
49	1220206	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
50	1228671	N	N	N	N	N	Y	Y	N	N	N	N	N	N	N	N	N	N
51	1229711	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
52	1229710	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
53	1228196	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N
54	1244464	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N
55	1245492	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
56	1244972	N	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N
57	1244580	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N	N
58	1245636	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
59	1247642	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
60	1248935	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
61	1251682	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
62	1253075	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	N
63	1253173	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
64	1251306	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N	N

Sr. No	MRD No	Umbilical line inserted by	Indication of insertion of umbilical line	Antenatal problems	Type of delivery	Asphyxia	Cry	Feeding	Period of mechanical ventilation	ROP	BPD	WEIGHT	HEIGHT	HC	HB	TCL
32	1166926	Fellow	Prematurity, mechanical ventilation	LPV X 24 hours, PTLP X 12 hours	LSCS under SA	YES	NO	EBM	4	zone 1 stage 1 , no preplus disease	NO	1100	36	25	12.2	11.1
33	1166942	Fellow	IBP monitoring	none	Vaginal delivery	NO	immediate	EBM	NO	normal limits	NO	3300	46	32	17.1	19.1
34	1167745	Fellow	prematurity	Rh-ve pregnancy. PPROM, anhydramnios, sepsis	Vaginal delivery	NO	immediate	EBM	6	zone 2 stage 2, no preplus disease	NO	740	32	22	14.9	24.1
35	1169931	Fellow	Prematurity, mechanical ventilation	PPROM	LSCS under SA	YES	NO	-	3	not done	NO	875	32	26	11.5	11.6
36	1166725	Fellow	Prematurity, mechanical ventilation	Pre-Eclampsia, UTI, Renal Insufficiency	LSCS under SA	YES	NO	EBM	7	normal limits	NO	910	33	29	14.3	8.1
37	1166909	Fellow	Prematurity, mechanical ventilation	none	Vaginal delivery	NO	immediate	EBM	6	normal limits	NO	2500	49	33	13.9	11.4
38	1175763	Fellow	prematurity, mechanical ventilation, inotopic support	overt hypothyroidism, APH, PPROM, Breech, Anemia, Anhydramnios	LSCS under SA	NO	immediate	EBM	7	Tunica Vasculosa lentis+	NO	1040	37	25	16.8	15.6
39	1180510	Fellow	mechanical ventilation	none	Vaginal delivery	NO	immediate	EBM	6	normal limits	NO	1900	44	39	20.3	19.9
40	1180480	Fellow	mechanical ventilation, IBP monitoring	none	LSCS under SA	NO	immediate	EBM	4	normal limits	NO	3300	50	34	13.7	15.6
41	1183296	Fellow	prematurity	LPV X 1 day	LSCS under SA	NO	immediate	EBM	NO	normal limits	NO	1700	39	28	19	11.7
42	1185329	Fellow	Prematurity, IBP monitoring mechanial ventilation	Absent diastolic flow, abnormal cerebro placental ratio	LSCS under SA	NO	immediate	EBM	6	normal limits	NO	640	31	23	16.3	15.9
43	1215980	Fellow	Prematurity, mechanical ventilation	twin pregnancy, PTLPs PPROM, breech	LSCS under SA	NO	immediate	EBM	6	Rt Eye: zone 2,3 immature, no preplus disease LT eye: zone 2 stage1, no preplus disease	NO	1040	34.5	25	14.5	17.8
44	1215979	Fellow	Prematurity, mechanical ventilation	twin pregnancy, PTLPs PPROM, breech	LSCS under SA	NO	immediate	EBM	4	TVI+ hazy view, disc normal highly immature retina, hazy cornea	NO	1090	37	26	13.1	17.8
45	1213600	Fellow	Prematurity, mechanical ventilation	gestational HTN, PE with severe feature, hyothyroidism, impaired LFTs	LSCS under SA	NO	immediate	EBM	5	normal limits	NO	1340	39	29	17.5	11.9
46	1217682	Fellow	Prematurity, mechanical ventilation	discordant growth, FGR II, decreased diastolic flow	LSCS under SA	NO	immediate	EBM	6	zone 2, 3 immature, no preplus disease	NO	1600	45	32	17.5	16
47	1217681	Fellow	Prematurity, IBP monitoring mechanial ventilation	discordant growth, FGR II, decreased diastolic flow	LSCS under SA	NO	immediate	EBM	5	zone 2, 3 immature, no preplus diasese	NO	775	34	26	21	8.5
48	1228655	Fellow	prematurity, mechanical ventilation, IBP monitoring, inotropic support	scar tenderness, PTLPs, PPROM	LSCS under SA	YES	NO	EBM	6	zone 2 3 immature no preplus disease	NO	1120	32	25	12.4	28.2
49	1220206	Fellow	prematurity, mechanical ventilation, IBP monitoring, inotropic support	APH, placenta previa type 2b with accreta, leptospira+	LSCS under GA	YES	NO	EBM	4	zone 2 3 immature no preplus disease	NO	1120	35	26.5	17	21
50	1228671	Fellow	Premature,Inotropic support	PTLPs, Mcdonad's stitch	Vaginal delivery	NO	immediate	EBM	NO	zone 2 3 immature no preplus disease	NO	1280	40	30	13.6	21.5
51	1229711	Fellow	prematurity	ANA+, Bicornuate uterus	LSCS under GA	NO	immediate	EBM	NO	normal limits	-	1260	39	28	17.3	5.9
52	1229710	Fellow	prematurity	ANA+, Bicornuate uterus	LSCS under GA	NO	immediate	EBM	NO	normal limits	-	1560	41	28	16.9	10
53	1228196	Fellow	inotropic suport, IBP monitoring, Mechanical ventilation	none	Vaginal delivery	NO	immediate	EBM	4	-	NO	1720	43	31	22.8	12.6
54	1244464	Fellow	Prematurity, mechanical ventilation	?Gestational hypertension	Vaginal delivery	YES	NO	EBM	6	-	NO	2300	47	33.5	19.2	18.2
55	1245492	Fellow	prematurity, mechanical ventilation, IBP monitoring, inotropic support	GDM A1,antenatal scan s/o hypoplastic kidney	LSCS under SA	NO	immediate	EBM	4	zone 3 immature, no preplus disease	-	2250	48	32	16	47.7
56	1244972	Fellow	prematurity, mechanical ventilation, IBP monitoring, inotropic support	twins DA/DC, twin B: oligohydramnios	Vaginal delivery	YES	NO	EBM	4	zone 3 immature, no preplus disease	NO	740	34	21	11.8	14.6
57	1244580	Fellow	prematurity, mechanical ventilation, IBP monitoring, inotropic support	PPROM, Rh -ve pregnancy, LPV, PTLPs	LSCS under SA	YES	NO	EBM	5	normal limits	NO	1430	40	27	13.6	20.9
58	1245636	Fellow	prematurity, mechanical ventilation, IBP monitoring, inotropic support	Severe oligohydramnios, APH, PPROM	LSCS under SA	NO	immediate	EBM	3	normal limits	NO	1785	44	29	21.9	11.6
59	1247642	Fellow	Prematurity, mechanical ventilation	subclinical hypothyroidism	LSCS under SA	NO	immediate	EBM	3	zone 2,3 immature no preplus disease	NO	1680	41	28	19.6	13.7
60	1248935	Fellow	Prematurity, IBP monitoring mechanial ventilation	Preeclampsia with severe features, overt Hypothyroidism	LSCS under SA	NO	delayed	EBM	4	zone 2,3 immature no preplus disease	NO	1440	40	27	16.6	11.9
61	1251682	Fellow	Prematurity, mechanical ventilation	APH, Placenta Previa IV	LSCS under SA	NO	immediate	EBM	4	zone 2,3 immature no preplus disease	NO	1460	40	29	16.2	10
62	1253075	Fellow	prematurity, mechanical ventilation, inotopic support	GDMA1, Fetal complete heart block, sjogren syndrme	LSCS under SA	NO	immediate	EBM	6	normal limits	NO	1860	44	31	18.5	7.5
63	1253173	Fellow	prematurity, mechanical ventilation, inotopic support	G.HTN, GDMA2, subclinical hypothyroidism, fetoplacental insufficiency	LSCS under GA	YES	NO	EBM	6	normal limits	NO	1650	43	31	13.9	9.3
64	1251306	Fellow	prematurity	Rh -ve pregnanacy	LSCS under SA	NO	immediate	EBM	NO	-	-	2000	46	33	13.6	25.8

Sr. No	MRD No	Platelet	CRP	PCT	Blood culture	Umbilical catheter tip culture	HAND WASH Done	HAND WASH Done After Reminder	HAND WASH Adequate time for hand hygiene	Heparin connected to umbilical artery line	Periodical checks for local sighs of inflammationswelling	Watch for lower limb colour and perfusion	Assemble equipment/verify supplies	Done After Reminder	Inform Radiology
32	1166926	171	13.99	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
33	1166942	379	145.2	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
34	1167745	368	8.08	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
35	1169931	223	2	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
36	1166725	362	0.71	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
37	1166909	591	1.37	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
38	1175763	319	1.59	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
39	1180510	414	1.64	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
40	1180480	635	4.21	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
41	1183296	328	0.82	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
42	1185329	196	0.55	0.48	No growth	enterococcus feacium	YES	NO	YES	YES	YES	YES	YES	-	YES
43	1215980	534	2.07	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
44	1215979	500	2.9	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
45	1213600	490	1.13	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
46	1217682	396	15.33	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
47	1217681	453	1.1	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
48	1228655	719	146.5	-	candida tropicalis	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
49	1220206	407	2	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
50	1228671	695	36.28	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
51	1229711	244	0.19	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
52	1229710	273	0.31	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
53	1228196	224	10.89	0.82	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
54	1244464	515	61.34	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
55	1245492	630	85.66	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
56	1244972	423	2	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
57	1244580	503	0.93	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
58	1245636	244	0.67	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
59	1247642	457	1	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
60	1248935	434	0.13	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
61	1251682	244	0.54	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
62	1253075	259	7.24	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
63	1253173	352	4.37	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
64	1251306	479	2	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES

Sr. No	MRD No	Done After Reminder	Assess, cleanse the site	Done After Reminder	Position patient correctly for procedure	Done After Reminder	Wear sterile gown and gloves	Done After Reminder	Drape a large area exposing ONLY site	Done After Reminder	Prepare site with 2% chlorhexidine/4% alcohol solution	Done After Reminder	Prepare site for 30 seconds	Done After Reminder	Dry for up to 60 seconds without fanning/wiping	Done After Reminder
32	1166926	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
33	1166942	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
34	1167745	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
35	1169931	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
36	1166725	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
37	1166909	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
38	1175763	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
39	1180510	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
40	1180480	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
41	1183296	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
42	1185329	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
43	1215980	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
44	1215979	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
45	1213600	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
46	1217682	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
47	1217681	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
48	1228655	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
49	1220206	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
50	1228671	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
51	1229711	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
52	1229710	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
53	1228196	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
54	1244464	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
55	1245492	-	YES	-	YES	-	YES	-	YES	-	YES	-	NO	YES	YES	-
56	1244972	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
57	1244580	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
58	1245636	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
59	1247642	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
60	1248935	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
61	1251682	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
62	1253075	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
63	1253173	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
64	1251306	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-

Sr. No	MRD No	Maintain sterile field throughout procedure	Done After Reminder	Did the assistant follow the same precautions? (Hand washing, mask, gloves and gown)	Done After Reminder (Hand washing, mask, gloves and gown)	Was sterility maintained when applying dressing/ stitches?	Done After Reminder	Was sterile field compromised during line readjustment?	Done After Reminder sterile field	Were IV fluids/lines being attached aseptically?	Done After Reminder IV fluids/line
32	1166926	YES	-	YES	-	YES	-	NO	-	YES	-
33	1166942	YES	-	YES	-	YES	-	NO	-	YES	-
34	1167745	YES	-	YES	-	YES	-	NO	-	YES	-
35	1169931	YES	-	YES	-	YES	-	NO	-	YES	-
36	1166725	YES	-	YES	-	YES	-	NO	-	YES	-
37	1166909	YES	-	YES	-	YES	-	NO	-	YES	-
38	1175763	YES	-	YES	-	YES	-	NO	-	YES	-
39	1180510	YES	-	YES	-	YES	-	NO	-	YES	-
40	1180480	YES	-	YES	-	YES	-	NO	-	YES	-
41	1183296	YES	-	YES	-	YES	-	NO	-	YES	-
42	1185329	YES	-	YES	-	YES	-	YES	YES	YES	-
43	1215980	YES	-	YES	-	YES	-	NO	-	YES	-
44	1215979	YES	-	YES	-	YES	-	NO	-	YES	-
45	1213600	YES	-	YES	-	YES	-	NO	-	YES	-
46	1217682	YES	-	YES	-	YES	-	NO	-	YES	-
47	1217681	YES	-	YES	-	YES	-	NO	-	YES	-
48	1228655	YES	-	YES	-	YES	-	NO	-	YES	-
49	1220206	YES	-	YES	-	YES	-	NO	-	YES	-
50	1228671	YES	-	YES	-	YES	-	NO	-	YES	-
51	1229711	YES	-	YES	-	YES	-	NO	-	YES	-
52	1229710	YES	-	YES	-	YES	-	NO	-	YES	-
53	1228196	YES	-	YES	-	YES	-	NO	-	YES	-
54	1244464	YES	-	YES	-	YES	-	NO	-	YES	-
55	1245492	YES	-	YES	-	YES	-	NO	-	YES	-
56	1244972	YES	-	YES	-	YES	-	NO	-	YES	-
57	1244580	YES	-	YES	-	YES	-	NO	-	YES	-
58	1245636	YES	-	YES	-	YES	-	NO	-	YES	-
59	1247642	YES	-	YES	-	YES	-	NO	-	YES	-
60	1248935	YES	-	YES	-	YES	-	NO	-	YES	-
61	1251682	YES	-	YES	-	YES	-	NO	-	YES	-
62	1253075	YES	-	YES	-	YES	-	NO	-	YES	-
63	1253173	YES	-	YES	-	YES	-	NO	-	YES	-
64	1251306	YES	-	YES	-	YES	-	NO	-	YES	-

Sr. No	MRD No	Is the umbilical line dressing changed routinely?	Done After Reminder umbilical line dressing	TOP SHELF_Sterile Towels	Sterile Gowns	Caps (in plastic bag)	Masks	UAC Trays	BOTTOM SHELF_#6 Fr. Single Lumen Umbilical line	#5 Fr. Single Lumen Umbilical line	#3.5 Fr. Single Lumen Umbilical line	#3 Fr, Single Lumen Umbilical line	DRAWERS_Sterile Gloves	Measuring Tape
32	1166926	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
33	1166942	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
34	1167745	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
35	1169931	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
36	1166725	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
37	1166909	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
38	1175763	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
39	1180510	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
40	1180480	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
41	1183296	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
42	1185329	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
43	1215980	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
44	1215979	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
45	1213600	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
46	1217682	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
47	1217681	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
48	1228655	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
49	1220206	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
50	1228671	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
51	1229711	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
52	1229710	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
53	1228196	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
54	1244464	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
55	1245492	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
56	1244972	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
57	1244580	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
58	1245636	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
59	1247642	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
60	1248935	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
61	1251682	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
62	1253075	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
63	1253173	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
64	1251306	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Sr. No	MRD No	0.9% NaCl Vial	0.9% NaCl Pre-filled Syringe Package	5mL Syringe	10mL Syringe	Needles (22G, 27G)	Catheter Introducer (22G, 24G)	4”x4” Gauze	2”x2” Gauze	#3.0 Silk Suture	Sterile Scissors and Tweezers set	IV Extension Set	Tegaderm small (4.4cm x 4.4cm)	Tegaderm medium (6cm x 7cm)	Tegaderm large (10cm x 12cm)
32	1166926	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
33	1166942	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
34	1167745	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
35	1169931	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
36	1166725	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
37	1166909	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
38	1175763	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
39	1180510	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
40	1180480	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
41	1183296	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
42	1185329	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
43	1215980	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
44	1215979	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
45	1213600	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
46	1217682	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
47	1217681	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
48	1228655	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
49	1220206	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
50	1228671	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
51	1229711	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
52	1229710	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
53	1228196	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
54	1244464	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
55	1245492	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
56	1244972	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
57	1244580	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
58	1245636	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
59	1247642	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
60	1248935	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
61	1251682	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
62	1253075	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
63	1253173	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
64	1251306	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Sr. No	MRD No	Clamps, non-tooth, non-sterile	Alcohol for cleaning cart top	Tapes	OUTCOME Discharge	• Proper size of catheter inserted	• Back flow checked	washinh hands prior to touching the line	closed system	is the line being placed away from potential areas of contamination	scrubbing up and down on the IV tubing and line?	Does the nurse wait for the port to dry after swabbing before accessing?	umbilical line dressing changed routinely
32	1166926	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
33	1166942	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
34	1167745	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
35	1169931	YES	YES	YES	DEATH	YES	YES	YES	YES	YES	YES	YES	YES
36	1166725	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
37	1166909	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
38	1175763	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
39	1180510	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
40	1180480	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
41	1183296	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
42	1185329	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
43	1215980	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
44	1215979	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
45	1213600	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
46	1217682	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
47	1217681	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
48	1228655	YES	YES	YES	DEATH	YES	YES	YES	YES	YES	YES	YES	YES
49	1220206	YES	YES	YES	DOR	YES	YES	YES	YES	YES	YES	YES	YES
50	1228671	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
51	1229711	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
52	1229710	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
53	1228196	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
54	1244464	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
55	1245492	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
56	1244972	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
57	1244580	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
58	1245636	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
59	1247642	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
60	1248935	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
61	1251682	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
62	1253075	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
63	1253173	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
64	1251306	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES

Sr. No	MRD No	Name of patient	group	HOSPITAL STAY	PDSA	Age	Age group	Gender	Gest. Age	Time taken	No of days of umbilical line	umbilical line rate	umbilical line days/1000	Diagnosis	Twins	term	Extrem preterm	Early Preterm
65	1257706	B/O Sunita	2	28	4	1	1	MALE	28	9	10	11.45	4.92	PT/AGA/IST OF TWIN/VLBW/SEVERE RDS/RF/NNH	Y	N	N	N
66	1256825	B/O Prabhjot	2	16	4	1	1	MALE	26	10	7	8.02	3.44	EXPT/AGA/ELBW/SEVERE RDS/RF/PNA/NNH/FIRST OF TRIPLETS	N	N	Y	N
67	1257713	B/o harpreet Kaur	2	9	4	1	1	MALE	34	10	6	6.87	2.95	LPT/AGA/LBW/PNA/SEVERE RDS/RF/ SHOCK	N	N	N	N
68	1258808	B/O Prabhjot Bawa 2	2	11	4	1	1	FEMALE	26	9	5	5.73	2.46	EXPT/AGA/ELBW/SEVERE RDS/RF/PNA/NNH/SECOND OF TRIPLETS	N	N	Y	N
69	1258810	B/O Prabhjot Bawa3	2	37	4	1	1	MALE	26	8	8	9.16	3.94	EXPT/AGA/ELBW/SEVERE RDS/RF/PNA/NNH/THIRD OF TRIPLETS	N	N	Y	N
70	1260855	B/O Nina Yadav1	2	17	4	1	1	MALE	28	10	11	12.60	5.41	PT/AGA/VLBW/SEVERE RDS/RF/NNH/ ACYANOTIC CHD	N	N	N	N
71	1260857	B/O Nina Yadav2	2	33	4	1	1	FEMALE	28	10	10	11.45	4.92	PT/AGA/VLBW/SEVERE RDS/RF/NNH	N	N	N	N
72	1084347	b/o roshni	1	22	0	1	1	MALE	34	25	11	12.60	5.41	LPT/AGA/Resp Filure/Cong. Pneumonia/EOS/Bal culture positive for Acinetobacter	N	N	N	N
73	1082377	b/o rajdeep	1	9	0	1	1	FEMALE	36	20	14	16.04	6.89	LPT/AGA/Resp Filure/Cong. Pneumonia/EOS/Blood culture positive for Candida	N	N	N	N
74	1074360	b/o pooja	1	7	0	1	1	MALE	39	20	10	11.45	4.92	T/AGA/PNA	N	Y	N	N
75	1077941	b/o ekta twin 2	1	10	0	1	1	FEMALE	28	30	10	11.45	4.92	PT/AGA/ELBW/RDS/NNH (DA+DC Twin)/NEC Stage2	Y	N	N	N
76	1055469	b/o harpreet	1	12	0	1	1	FEMALE	29	20	11	12.60	5.41	PT/AGA/Severe Resp. Distress/Resp. Failure/Shock	N	N	N	N
77	1094924	b/o ravinder	1	43	0	1	1	FEMALE	27	30	7	8.02	3.44	EPT/AGA/VLBW/RDS/Congenital Pneumonia/RF/NNH	N	N	N	Y
78	1101738	b/o navpreet	1	8	0	11	2	MALE	30	25	15	17.18	7.38	PT/AGA/RDS	N	N	N	N
79	-	b/o karamveer	1	9	0	12	2	MALE	33	20	10	11.45	4.92	PT/AGA/MOD RDS/APOP/NNH/Feed intolerance/Hyponatremia of prematurity	N	N	N	N
80	1107735	b/o nirmala	1	8	0	2	2	MALE	31	20	8	9.16	3.94	PT/AGA/VLBW/RDS/RF/AKI/PDA	N	N	N	N
81	1113894	b/o paramjeet	1	5	0	1	1	MALE	27	30	9	10.31	4.43	ExPT/SGA/RDS/RF	N	N	Y	N
82	1072047	b/o poonam	1	8	0	1	1	MALE	33	20	12	13.75	5.90	PT/AGA/Moderate RDS	N	N	N	N
83	1055316	b/o rimple	1	8	0	1	1	FEMALE	28	20	8	9.16	3.94	ExPT/AGA/VLBW/RF/RDS/Shock	N	N	Y	N
84	1056250	b/o jaspreet	1	8	0	1	1	MALE	30	20	8	9.16	3.94	PT/AGA/RF/PNA/NNH/RDS	N	N	N	N
85	1050916	b/o yogita	1	14	0	1	1	MALE	27	20	13	14.89	6.39	ExPT/AGA/RDS/RF/Shock/Pulmonary Hemmorhage/NNH/EOS	N	N	Y	N
86	676559	b/o pooja	1	30	0	1	1	FEMALE	31	20	13	14.89	6.39	PT/AGA/RDS/Congenital pneumonia/EOS/NNH	N	N	N	N
87	1127202	b/o jaskirat	1	34	0	1	1	MALE	27	20	11	12.60	5.41	ExPT/AGA/ELBW/RDS/RF/Asymptomatic Hypoglycemia	N	N	Y	N
88	1127104	b/o poornima	1	11	0	1	1	MALE	32	20	14	16.04	6.89	PT/AGA/Moderate RDS	N	N	N	N
89	1131477	b/ poonam	1	5	0	1	1	MALE	31	20	10	11.45	4.92	PT/AGA/RDS/APOP/NNH (prematurity)	N	N	N	N
90	1131467	b/o savita	1	14	0	1	1	FEMALE	30	20	15	17.18	7.38	PT/AGA/RDS	N	N	N	N
91	1133499	b/o deeksha	1	12	0	1	1	FEMALE	27	20	7	8.02	3.44	EPT/AGA/VLBW/RDS/RF/APOP	N	N	N	Y
92	1133508	b/o mandeep twin 1	1	17	0	1	1	MALE	30	30	9	10.31	4.43	EPT/AGA/NNH/RF/TCP/Abnormal Doppler/Shock	N	N	N	Y
93	1133509	b/o mandeep twin 2	1	17	0	1	1	MALE	30	30	8	9.16	3.94	EPT/AGA/NNH/RF/TCP/Abnormal Doppler/Shock	N	N	N	Y
94	1133512	b/o navneet	1	12	0	1	1	MALE	38	20	5	5.73	2.46	T/AGA/NNH/Rh negative pregnancy	N	Y	N	N
95	1135214	b/o sonia	1	8	0	1	1	MALE	24	25	7	8.02	3.44	Expt/AGA/Severe RDS/RF/ELBW/NNH/Rh -ve pregnancy	N	N	Y	N
96	1133564	b/o Rajni	1	22	0	1	1	MALE	31	20	14	16.04	6.89	EPT/AGA/VLBW/RDS/Congenital Pneumonia	N	N	N	Y
97	1136622	b/o Ashima	1	16	0	1	1	MALE	32	20	13	14.89	6.39	PT/AGA/RDS/LBW/abnorma doppler/Bradycardia/Shock	N	N	N	N
98	1135274	b/o shalu	1	8	0	1	1	MALE	36	25	7	8.02	3.44	LPT/SGA/RF/Seizures/LOS/?IEM	N	N	N	N
99	1135289	b/o manpreet	1	12	0	1	1	FEMALE	35	25	11	12.60	5.41	LPT/AGA/RDS/Congenital Pneumonia	N	N	N	N
100	1135280	b/o inder	1	16	0	1	1	FEMALE	26	20	7	8.02	3.44	EPT/AGA/ELBW/RF/RDS/LOS/NEC/AOP/TCP	N	N	N	Y
101	1135131	b/o harpreet	1	21	0	1	1	MALE	30	20	12	13.75	5.90	PT/AGA/RDS/RF/PNA/Shock/Post CPR survivor	N	N	N	N

Sr. No	MRD No	Late Preterm	Appropiate for gestational	SGA	LGA	LBW	ELBW	VLBW	Respiratory Failure	Respiratory distress syndrome	Early onset sepsis	PPHN	Cong pneumonia	Neonatal hyperbilirubinemia	Seizures	Sepsis	Staph skin infection	PNA	Shock	Asympomatic Polycythemia	Asymptomatic hypoglycemoia	Anemia of prematurity
65	1257706	Y	Y	N	N	N	N	Y	Y	Y	N	N	N	Y	N	N	N	N	N	N	N	N
66	1256825	N	Y	N	N	N	Y	N	Y	Y	N	N	N	Y	N	N	N	Y	N	N	N	N
67	1257713	Y	Y	N	N	Y	N	N	Y	Y	N	N	N	N	N	N	N	Y	Y	N	N	N
68	1258808	N	Y	N	N	N	Y	N	Y	Y	N	N	N	Y	N	N	N	Y	N	N	N	N
69	1258810	N	Y	N	N	N	Y	N	Y	Y	N	N	N	Y	N	N	N	Y	N	N	N	N
70	1260855	Y	Y	N	N	N	N	Y	Y	Y	N	N	N	Y	N	N	N	N	N	N	N	N
71	1260857	Y	Y	N	N	N	N	Y	Y	Y	N	N	N	Y	N	N	N	N	N	N	N	N
72	1084347	Y	Y	N	N	N	N	N	Y	N	Y	N	Y	N	N	N	N	N	N	N	N	N
73	1082377	Y	Y	N	N	N	N	N	Y	N	Y	N	Y	N	N	N	N	N	N	N	N	N
74	1074360	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N
75	1077941	Y	Y	N	N	N	Y	N	N	Y	N	N	N	Y	N	N	N	N	N	N	N	N
76	1055469	Y	Y	N	N	N	N	N	Y	Y	N	N	N	N	N	N	N	N	Y	N	N	N
77	1094924	N	Y	N	N	N	N	Y	Y	Y	N	N	Y	Y	N	N	N	N	N	N	N	N
78	1101738	Y	Y	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N
79	-	Y	Y	N	N	N	N	N	N	Y	N	N	N	Y	N	N	N	N	N	N	N	Y
80	1107735	Y	Y	N	N	N	N	Y	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N
81	1113894	N	N	Y	N	N	N	N	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N
82	1072047	Y	Y	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N
83	1055316	N	Y	N	N	N	N	Y	Y	Y	N	N	N	N	N	N	N	N	Y	N	N	N
84	1056250	Y	Y	N	N	N	N	N	Y	Y	N	N	N	Y	N	N	N	Y	N	N	N	N
85	1050916	N	Y	N	N	N	N	N	Y	Y	Y	N	N	Y	N	N	N	N	Y	N	N	N
86	676559	Y	Y	N	N	N	N	N	N	Y	Y	N	Y	Y	N	N	N	N	N	N	N	N
87	1127202	N	Y	N	N	N	Y	N	Y	Y	N	N	N	N	N	N	N	N	N	N	Y	N
88	1127104	Y	Y	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N
89	1131477	Y	Y	N	N	N	N	N	N	Y	N	N	N	Y	N	N	N	N	N	N	N	Y
90	1131467	Y	Y	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N
91	1133499	N	Y	N	N	N	N	Y	Y	Y	N	N	N	N	N	N	N	N	N	N	N	Y
92	1133508	N	Y	N	N	N	N	N	Y	N	N	N	N	Y	N	N	N	N	Y	N	N	N
93	1133509	N	Y	N	N	N	N	N	Y	N	N	N	N	Y	N	N	N	N	Y	N	N	N
94	1133512	N	Y	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	N
95	1135214	N	Y	N	N	N	Y	N	Y	Y	N	N	N	Y	N	N	N	N	N	N	N	N
96	1133564	N	Y	N	N	N	N	Y	N	Y	N	N	Y	N	N	N	N	N	N	N	N	N
97	1136622	Y	Y	N	N	Y	N	N	N	Y	N	N	N	N	N	N	N	N	Y	N	N	N
98	1135274	Y	N	Y	N	N	N	N	Y	N	N	N	N	N	Y	N	N	N	N	N	N	N
99	1135289	Y	Y	N	N	N	N	N	N	Y	N	N	Y	N	N	N	N	N	N	N	N	N
100	1135280	N	Y	N	N	N	Y	N	Y	Y	N	N	N	N	N	N	N	N	N	N	N	Y
101	1135131	Y	Y	N	N	N	N	N	Y	Y	N	N	N	N	N	N	N	Y	Y	N	N	N

Sr. No	MRD No	Apnea of Prematurity	Oedema of Prematurity	Hyponatremia of prematurity	Metabolic Bone disease	Meconium aspiration syndrome	LOS	NEC	TCP	HIE	Abnormal doppler	Bradycardia	RH isoimmunization	RH-IVE PREGNANCY	CONGENITAL HEART BLOCK	MYOCARDITIS	NEONATAL MIS-N	Pst CPR surviovor
65	1257706	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
66	1256825	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
67	1257713	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
68	1258808	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
69	1258810	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
70	1260855	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
71	1260857	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
72	1084347	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
73	1082377	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
74	1074360	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
75	1077941	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N
76	1055469	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
77	1094924	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
78	1101738	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
79	-	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N
80	1107735	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
81	1113894	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
82	1072047	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
83	1055316	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
84	1056250	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
85	1050916	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
86	676559	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
87	1127202	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
88	1127104	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
89	1131477	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
90	1131467	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
91	1133499	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
92	1133508	N	N	N	N	N	N	N	Y	N	Y	N	N	N	N	N	N	N
93	1133509	N	N	N	N	N	N	N	Y	N	Y	N	N	N	N	N	N	N
94	1133512	N	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N
95	1135214	N	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N
96	1133564	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
97	1136622	N	N	N	N	N	N	N	N	N	Y	Y	N	N	N	N	N	N
98	1135274	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N
99	1135289	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
100	1135280	Y	N	N	N	N	Y	Y	Y	N	N	N	N	N	N	N	N	N
101	1135131	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y

Sr. No	MRD No	Umbilical line inserted by	Indication of insertion of umbilical line	Antenatal problems	Type of delivery	Asphyxia	Cry	Feeding	Period of mechanical ventilation	ROP	BPD	WEIGHT	HEIGHT	HC	HB	TCL
65	1257706	Fellow	prematurity, mechanical ventilation, inotopic support	CARDIOMYOPATHY, SEPSIS	LSCS under GA	NO	immediate	EBM	3	normal limits	-	960	38	27	19.7	9.3
66	1256825	Fellow	prematurity, mechanical ventilation, inotopic support	overt hypothyroidism, PTLPs, UTI	Vaginal delivery	YES	NO	EBM	3	normal limits	-	640	31	22	12.6	89.8
67	1257713	Fellow	prematurity, mechanical ventilation, inotopic support	eclampsia	LSCS under GA	NO	immediate	EBM	4	normal limits	-	2160	48	33.5	15.5	16.6
68	1258808	Fellow	prematurity, mechanical ventilation, inotopic support	overt hypothyroidism, PTLPs, UTI	Vaginal delivery	NO	immediate	EBM	7	-	-	740	35	27.5	15	19.7
69	1258810	Fellow	prematurity, mechanical ventilation, inotopic support	overt hypothyroidism, PTLPs, UTI	Vaginal delivery	YES	NO	EBM	10	-	-	680	32	22.5	15.9	22.6
70	1260855	Fellow	prematurity, mechanical ventilation, inotopic support	APH, placenta accreta, PTLPs, Impaired LFT	LSCS under GA	NO	immediate	EBM	4	RETCAM: mild arterial tortuosity (left>right)	NO	1330	39	27.5	14.6	8.2
71	1260857	Fellow	prematurity, mechanical ventilation, inotopic support	APH, placenta accreta, PTLPs, Impaired LFT	LSCS under GA	YES	NO	EBM	5	-	-	950	36	25	18.9	13.1
72	1084347	JR	prematurity/inotropic support /IBP Monitoring	Oligohydramnios	LSCS under SA	NO	delayed	EBM	5	normal	no	2400	43	32	-	14.4
73	1082377	JR	prematurity	none	LSCS under SA	NO	immediate	EBM	6	normal	no	2770	48	33.5	-	12.7
74	1074360	JR	prematurity	fever X 2 days	NVD with ventouse	YES	NO	EBM	NO	normal	no	3495	50	35	-	13
75	1077941	JR	prematurity	anhydramnios, impaired LFT	LSCS under SA	NO	immediate	EBM	NO	normal	no	795	25	37.5	-	15.1
76	1055469	JR	prematurity and inotropic support	none	LSCS under GA	NO	immediate	EBM	3	normal	no	1250	39	26	-	17.3
77	1094924	JR	prematurity and inotropic support	-	LSCS under GA	NO	immediate	EBM	6	normal	no	1000	38	32	-	28.5
78	1101738	JR	prematurity	cervical incompetence	LSCS under SA	NO	immediate	EBM	NO	normal	no	1745	44	32	-	16
79	-	JR	prematurity	none	LSCS under SA	NO	immediate	EBM	NO	Highly immature retina	no	1080	34	25	-	12.7
80	1107735	JR	prematurity	PPROM	NVD	NO	immediate	EBM	7	Highly immature retina	no	1200	37	25	-	20.2
81	1113894	JR	prematurity and inotropic support	PPROM, Absent diastolic flow, anhydramnios	LSCS under SA	NO	immediate	EBM	7	Highly immature retina	no	585	31	20	-	16.5
82	1072047	JR	prematurity	none	LSCS under SA	NO	immediate	EBM	NO	normal	no	2100	40	31	-	16.8
83	1055316	JR	prematurity and inotropic support	PTLPs, PPROM, Breech, severe oligohydramnios	NVD	NO	immediate	EBM	1	normal	no	1000	37	26	-	29
84	1056250	JR	IBP Monitoring	oligohydramnios	LSCS under SA	YES	delayed	EBM	4	Highly immature retina	no	1565	40	27.5	-	18.1
85	1050916	JR	prematurity and inotropic support	APH, Oligo, PPROM	LSCS under SA	NO	immediate	EBM	7	TVL+, Highly immature retina	no	1120	37	26	-	15.1
86	676559	JR	prematurity	retroplacental clot	LSCS under GA	NO	immediate	EBM	NO	normal	no	2020	45	30	-	15.6
87	1127202	JR	IBP Monitoring	Absent diastolic flow, oligohydramnios	LSCS under SA	NO	immediate	EBM	10	Highly immature retina	no	660	32	23	-	12.7
88	1127104	JR	prematurity	PTLPs, PPROM, Breech	LSCS under SA	NO	immediate	EBM	NO	normal	no	2050	47	32	-	16
89	1131477	JR	prematurity	PTLPs	NVD	NO	immediate	EBM	NO	normal	no	2640	46	29.5	-	16.5
90	1131467	JR	prematurity	PTLPs, oligo	LSCS under SA	NO	immediate	EBM	NO	normal	no	1800	44	31	-	16.4
91	1133499	JR	IBP Monitoring	PTLPs, oligo, small fibroid on lateral wall	LSCS under SA	NO	immediate	EBM	7	Highly immature retina	no	1020	30	26	-	36.9
92	1133508	JR	IBP Monitoring	gestational HTN	LSCS under SA	YES	NO	EBM	10	Highly immature retina	no	980	32	26	-	15.7
93	1133509	JR	IBP Monitoring	gestational HTN	LSCS under SA	YES	NO	EBM	8	Highly immature retina	no	1280	30	24	-	15.1
94	1133512	JR	-	none	NVD	NO	immediate	EBM	NO	normal	no	2800	49	33	-	16
95	1135214	Fellow	IBP Monitoring	anhydroamnios,anemia, UTI	NVD	NO	immediate	EBM	6	Highly immature retina	no	740	32	22	-	20.8
96	1133564	JR	prematurity	PIH, LPV X 2 hrs	LSCS under GA	NO	immediate	EBM	NO	normal	no	1380	34	28	-	14.6
97	1136622	JR	prematurity	GDM A1,FGR 2, Abnormal doppler	LSCS under SA	NO	immediate	EBM	NO	normal	no	1600	42	30	-	8.3
98	1135274	JR	IBP Monitoring	PIH, LPV X 2 hrs	LSCS under SA	NO	immediate	EBM	4	normal	no	1700	43	31	-	11.8
99	1135289	JR	prematurity	PTLP, UTI	LSCS under SA	NO	immediate	EBM	NO	normal	no	2400	46	32	-	14.6
100	1135280	JR	IBP Monitoring	RPC, Anhydramnios, threatened abortion	LSCS under GA	YES	NO	EBM	8	Z2 stage 1 , NPP	no	820	35	23.5	-	15.5
101	1135131	JR	IBP Monitoring	pre-eclampsia with severe feature	LSCS	YES	NO	EBM	7	normal	no	1625	44	28	-	13.9

Sr. No	MRD No	Platelet	CRP	PCT	Blood culture	Umbilical catheter tip culture	HAND WASH Done	HAND WASH Done After Reminder	HAND WASH Adequate time for hand hygiene	Heparin connected to umbilical artery line	Periodical checks for local sighs of inflammationswelling	Watch for lower limb colour and perfusion	Assemble equipment/verify supplies	Done After Reminder	Inform Radiology
65	1257706	196	62.65	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
66	1256825	625	15.48	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
67	1257713	190	2	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
68	1258808	373	12.82	-	klebsiella pneumoniae	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
69	1258810	462	2	-	Candida Ciferri	no growth	YES	NO	NO	YES	YES	YES	YES	-	YES
70	1260855	247	1.85	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
71	1260857	227	5.22	-	No growth	no growth	YES	NO	YES	YES	YES	YES	YES	-	YES
72	1084347	526	7.81	-	No growth	Staphylococcus Aureus	NO	YES	-	-	-	-	-	-	-
73	1082377	540	7.04	-	candida parasilosis	No growth	YES	NO	-	-	-	-	-	-	-
74	1074360	445	3.85	-	No growth	E.Coli++	NO	YES	-	-	-	-	-	-	-
75	1077941	260	13.77	-	No growth	No growth	YES	NO	-	-	-	-	-	-	-
76	1055469	554	0.84	-	No growth	E.Coli++	YES	YES	-	-	-	-	-	-	-
77	1094924	577	2.01	-	No growth	No growth	YES	NO	-	-	-	-	-	-	-
78	1101738	486	2.6	-	No growth	No growth	YES	NO	-	-	-	-	-	-	-
79	-	325	9	-	No growth	No growth	YES	NO	-	-	-	-	-	-	-
80	1107735	483	8.47	-	No growth	E.Coli++	YES	YES	-	-	-	-	-	-	-
81	1113894	130	-	-	No growth	No growth	YES	NO	-	-	-	-	-	-	-
82	1072047	294	0.33	-	No growth	No growth	YES	NO	-	-	-	-	-	-	-
83	1055316	636	1.17	-	No growth	No growth	YES	NO	-	-	-	-	-	-	-
84	1056250	279	0.43	-	No growth	No growth	YES	NO	-	-	-	-	-	-	-
85	1050916	848	1.07	-	No growth	No growth	YES	NO	-	-	-	-	-	-	-
86	676559	699	21.02	-	No growth	No growth	YES	NO	-	-	-	-	-	-	-
87	1127202	150	0.8	-	No growth	No growth	YES	NO	-	-	-	-	-	-	-
88	1127104	240	2.06	-	No growth	No growth	YES	NO	-	-	-	-	-	-	-
89	1131477	295	0.25	-	No growth	No growth	YES	NO	-	-	-	-	-	-	-
90	1131467	279	0.67	-	No growth	No growth	YES	NO	-	-	-	-	-	-	-
91	1133499	259	20.41	-	No growth	No growth	YES	NO	-	-	-	-	-	-	-
92	1133508	248	29.82	-	No growth	No growth	YES	NO	-	-	-	-	-	-	-
93	1133509	473	0.29	-	No growth	No growth	YES	NO	-	-	-	-	-	-	-
94	1133512	450	0.21	-	No growth	No growth	YES	NO	-	-	-	-	-	-	-
95	1135214	368	8.08	-	No growth	No growth	YES	NO	-	-	-	-	-	-	-
96	1133564	442	3.2	-	No growth	E.Coli++	YES	NO	-	-	-	-	-	-	-
97	1136622	212	0.64	-	No growth	No growth	YES	NO	-	-	-	-	-	-	-
98	1135274	244	11.05	-	E.Coli	psuedonionas sp	NO	YES	-	-	-	-	-	-	-
99	1135289	422	2.3	-	No growth	No growth	YES	NO	-	-	-	-	-	-	-
100	1135280	916	0.34	-	No growth	No growth	YES	NO	-	-	-	-	-	-	-
101	1135131	223	1.03	-	No growth	No growth	YES	NO	-	-	-	-	-	-	-

Sr. No	MRD No	Done After Reminder	Assess, cleanse the site	Done After Reminder	Position patient correctly for procedure	Done After Reminder	Wear sterile gown and gloves	Done After Reminder	Drape a large area exposing ONLY site	Done After Reminder	Prepare site with 2% chlorhexidine/4% alcohol solution	Done After Reminder	Prepare site for 30 seconds	Done After Reminder	Dry for up to 60 seconds without fanning/wiping	Done After Reminder
65	1257706	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
66	1256825	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
67	1257713	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
68	1258808	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
69	1258810	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
70	1260855	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
71	1260857	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-	YES	-
72	1084347	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
73	1082377	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
74	1074360	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
75	1077941	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
76	1055469	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
77	1094924	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
78	1101738	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
79	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
80	1107735	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
81	1113894	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
82	1072047	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
83	1055316	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
84	1056250	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
85	1050916	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
86	676559	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
87	1127202	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
88	1127104	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
89	1131477	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
90	1131467	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
91	1133499	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
92	1133508	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
93	1133509	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
94	1133512	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
95	1135214	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
96	1133564	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
97	1136622	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
98	1135274	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
99	1135289	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
100	1135280	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
101	1135131	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Sr. No	MRD No	Maintain sterile field throughout procedure	Done After Reminder	Did the assistant follow the same precautions? (Hand washing, mask, gloves and gown)	Done After Reminder (Hand washing, mask, gloves and gown)	Was sterility maintained when applying dressing/ stitches?	Done After Reminder	Was sterile field compromised during line readjustment?	Done After Reminder sterile field	Were IV fluids/lines being attached aseptically?	Done After Reminder IV fluids/line
65	1257706	YES	-	YES	-	YES	-	NO	-	YES	-
66	1256825	YES	-	YES	-	YES	-	NO	-	YES	-
67	1257713	YES	-	YES	-	YES	-	NO	-	YES	-
68	1258808	YES	-	YES	-	YES	-	NO	-	YES	-
69	1258810	YES	-	YES	-	YES	-	NO	-	YES	-
70	1260855	YES	-	YES	-	YES	-	NO	-	YES	-
71	1260857	YES	-	YES	-	YES	-	NO	-	YES	-
72	1084347	-	-	-	-	-	-	-	-	-	-
73	1082377	-	-	-	-	-	-	-	-	-	-
74	1074360	-	-	-	-	-	-	-	-	-	-
75	1077941	-	-	-	-	-	-	-	-	-	-
76	1055469	-	-	-	-	-	-	-	-	-	-
77	1094924	-	-	-	-	-	-	-	-	-	-
78	1101738	-	-	-	-	-	-	-	-	-	-
79	-	-	-	-	-	-	-	-	-	-	-
80	1107735	-	-	-	-	-	-	-	-	-	-
81	1113894	-	-	-	-	-	-	-	-	-	-
82	1072047	-	-	-	-	-	-	-	-	-	-
83	1055316	-	-	-	-	-	-	-	-	-	-
84	1056250	-	-	-	-	-	-	-	-	-	-
85	1050916	-	-	-	-	-	-	-	-	-	-
86	676559	-	-	-	-	-	-	-	-	-	-
87	1127202	-	-	-	-	-	-	-	-	-	-
88	1127104	-	-	-	-	-	-	-	-	-	-
89	1131477	-	-	-	-	-	-	-	-	-	-
90	1131467	-	-	-	-	-	-	-	-	-	-
91	1133499	-	-	-	-	-	-	-	-	-	-
92	1133508	-	-	-	-	-	-	-	-	-	-
93	1133509	-	-	-	-	-	-	-	-	-	-
94	1133512	-	-	-	-	-	-	-	-	-	-
95	1135214	-	-	-	-	-	-	-	-	-	-
96	1133564	-	-	-	-	-	-	-	-	-	-
97	1136622	-	-	-	-	-	-	-	-	-	-
98	1135274	-	-	-	-	-	-	-	-	-	-
99	1135289	-	-	-	-	-	-	-	-	-	-
100	1135280	-	-	-	-	-	-	-	-	-	-
101	1135131	-	-	-	-	-	-	-	-	-	-

Sr. No	MRD No	Is the umbilical line dressing changed routinely?	Done After Reminder umbilical line dressing	TOP SHELF_Sterile Towels	Sterile Gowns	Caps (in plastic bag)	Masks	UAC Trays	BOTTOM SHELF_#6 Fr. Single Lumen Umbilical line	#5 Fr. Single Lumen Umbilical line	#3.5 Fr. Single Lumen Umbilical line	#3 Fr, Single Lumen Umbilical line	DRAWERS_Sterile Gloves	Measuring Tape
65	1257706	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
66	1256825	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
67	1257713	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
68	1258808	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
69	1258810	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
70	1260855	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
71	1260857	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
72	1084347	-	-	-	-	-	-	-	-	-	-	-	-	-
73	1082377	-	-	-	-	-	-	-	-	-	-	-	-	-
74	1074360	-	-	-	-	-	-	-	-	-	-	-	-	-
75	1077941	-	-	-	-	-	-	-	-	-	-	-	-	-
76	1055469	-	-	-	-	-	-	-	-	-	-	-	-	-
77	1094924	-	-	-	-	-	-	-	-	-	-	-	-	-
78	1101738	-	-	-	-	-	-	-	-	-	-	-	-	-
79	-	-	-	-	-	-	-	-	-	-	-	-	-	-
80	1107735	-	-	-	-	-	-	-	-	-	-	-	-	-
81	1113894	-	-	-	-	-	-	-	-	-	-	-	-	-
82	1072047	-	-	-	-	-	-	-	-	-	-	-	-	-
83	1055316	-	-	-	-	-	-	-	-	-	-	-	-	-
84	1056250	-	-	-	-	-	-	-	-	-	-	-	-	-
85	1050916	-	-	-	-	-	-	-	-	-	-	-	-	-
86	676559	-	-	-	-	-	-	-	-	-	-	-	-	-
87	1127202	-	-	-	-	-	-	-	-	-	-	-	-	-
88	1127104	-	-	-	-	-	-	-	-	-	-	-	-	-
89	1131477	-	-	-	-	-	-	-	-	-	-	-	-	-
90	1131467	-	-	-	-	-	-	-	-	-	-	-	-	-
91	1133499	-	-	-	-	-	-	-	-	-	-	-	-	-
92	1133508	-	-	-	-	-	-	-	-	-	-	-	-	-
93	1133509	-	-	-	-	-	-	-	-	-	-	-	-	-
94	1133512	-	-	-	-	-	-	-	-	-	-	-	-	-
95	1135214	-	-	-	-	-	-	-	-	-	-	-	-	-
96	1133564	-	-	-	-	-	-	-	-	-	-	-	-	-
97	1136622	-	-	-	-	-	-	-	-	-	-	-	-	-
98	1135274	-	-	-	-	-	-	-	-	-	-	-	-	-
99	1135289	-	-	-	-	-	-	-	-	-	-	-	-	-
100	1135280	-	-	-	-	-	-	-	-	-	-	-	-	-
101	1135131	-	-	-	-	-	-	-	-	-	-	-	-	-

Sr. No	MRD No	0.9% NaCl Vial	0.9% NaCl Pre-filled Syringe Package	5mL Syringe	10mL Syringe	Needles (22G, 27G)	Catheter Introducer (22G, 24G)	4”x4” Gauze	2”x2” Gauze	#3.0 Silk Suture	Sterile Scissors and Tweezers set	IV Extension Set	Tegaderm small (4.4cm x 4.4cm)	Tegaderm medium (6cm x 7cm)	Tegaderm large (10cm x 12cm)
65	1257706	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
66	1256825	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
67	1257713	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
68	1258808	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
69	1258810	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
70	1260855	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
71	1260857	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
72	1084347	-	-	-	-	-	-	-	-	-	-	-	-	-	-
73	1082377	-	-	-	-	-	-	-	-	-	-	-	-	-	-
74	1074360	-	-	-	-	-	-	-	-	-	-	-	-	-	-
75	1077941	-	-	-	-	-	-	-	-	-	-	-	-	-	-
76	1055469	-	-	-	-	-	-	-	-	-	-	-	-	-	-
77	1094924	-	-	-	-	-	-	-	-	-	-	-	-	-	-
78	1101738	-	-	-	-	-	-	-	-	-	-	-	-	-	-
79	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
80	1107735	-	-	-	-	-	-	-	-	-	-	-	-	-	-
81	1113894	-	-	-	-	-	-	-	-	-	-	-	-	-	-
82	1072047	-	-	-	-	-	-	-	-	-	-	-	-	-	-
83	1055316	-	-	-	-	-	-	-	-	-	-	-	-	-	-
84	1056250	-	-	-	-	-	-	-	-	-	-	-	-	-	-
85	1050916	-	-	-	-	-	-	-	-	-	-	-	-	-	-
86	676559	-	-	-	-	-	-	-	-	-	-	-	-	-	-
87	1127202	-	-	-	-	-	-	-	-	-	-	-	-	-	-
88	1127104	-	-	-	-	-	-	-	-	-	-	-	-	-	-
89	1131477	-	-	-	-	-	-	-	-	-	-	-	-	-	-
90	1131467	-	-	-	-	-	-	-	-	-	-	-	-	-	-
91	1133499	-	-	-	-	-	-	-	-	-	-	-	-	-	-
92	1133508	-	-	-	-	-	-	-	-	-	-	-	-	-	-
93	1133509	-	-	-	-	-	-	-	-	-	-	-	-	-	-
94	1133512	-	-	-	-	-	-	-	-	-	-	-	-	-	-
95	1135214	-	-	-	-	-	-	-	-	-	-	-	-	-	-
96	1133564	-	-	-	-	-	-	-	-	-	-	-	-	-	-
97	1136622	-	-	-	-	-	-	-	-	-	-	-	-	-	-
98	1135274	-	-	-	-	-	-	-	-	-	-	-	-	-	-
99	1135289	-	-	-	-	-	-	-	-	-	-	-	-	-	-
100	1135280	-	-	-	-	-	-	-	-	-	-	-	-	-	-
101	1135131	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Sr. No	MRD No	Clamps, non-tooth, non-sterile	Alcohol for cleaning cart top	Tapes	OUTCOME Discharge	• Proper size of catheter inserted	• Back flow checked	washinh hands prior to touching the line	closed system	is the line being placed away from potential areas of contamination	scrubbing up and down on the IV tubing and line?	Does the nurse wait for the port to dry after swabbing before accessing?	umbilical line dressing changed routinely
65	1257706	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
66	1256825	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
67	1257713	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
68	1258808	YES	YES	YES	DEATH	YES	YES	YES	YES	YES	YES	YES	YES
69	1258810	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
70	1260855	YES	YES	YES	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
71	1260857	YES	YES	YES	DEATH	YES	YES	YES	YES	YES	YES	YES	YES
72	1084347	-	-	-	Discharge	YES	YES	NO	YES	YES	YES	YES	YES
73	1082377	-	-	-	DOR	YES	YES	YES	YES	YES	YES	YES	YES
74	1074360	-	-	-	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
75	1077941	-	-	-	DEATH	YES	YES	YES	YES	YES	YES	YES	YES
76	1055469	-	-	-	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
77	1094924	-	-	-	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
78	1101738	-	-	-	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
79	-	-	-	-	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
80	1107735	-	-	-	DEATH	YES	YES	YES	YES	YES	YES	YES	YES
81	1113894	-	-	-	DEATH	YES	YES	YES	YES	YES	YES	YES	YES
82	1072047	-	-	-	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
83	1055316	-	-	-	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
84	1056250	-	-	-	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
85	1050916	-	-	-	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
86	676559	-	-	-	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
87	1127202	-	-	-	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
88	1127104	-	-	-	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
89	1131477	-	-	-	DOR	YES	YES	YES	YES	YES	YES	YES	YES
90	1131467	-	-	-	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
91	1133499	-	-	-	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
92	1133508	-	-	-	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
93	1133509	-	-	-	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
94	1133512	-	-	-	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
95	1135214	-	-	-	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
96	1133564	-	-	-	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
97	1136622	-	-	-	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
98	1135274	-	-	-	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
99	1135289	-	-	-	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
100	1135280	-	-	-	Discharge	YES	YES	YES	YES	YES	YES	YES	YES
101	1135131	-	-	-	Discharge	YES	YES	YES	YES	YES	YES	YES	YES

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No. BFUHS/2K21p-III/ 1171 Date 25/11/21

The Principal,
DMC, Ludhiana.

Subject: **Approval of Plan of Thesis.**

This is to inform you that the Faculty of Medical Sciences in its meeting held on 29.10.2021 has approved the plan of thesis of **Himani**, a student of your college for **MD Paediatrics** along with the names of Supervisor/Co-Supervisor as under:-

Topic Plan of Thesis

Effect of quality improvement initiative on umbilical line associated blood stream infection in neonatal intensive care unit.

Supervisor
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Assoc. Prof.,
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Co-Supervisor

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The student has to submit the four copies of thesis (along with PDF format) , to the Controller of Examinations, BFUHS, Faridkot, at least six months before the commencement of theory examination, if he/she is otherwise eligible to take the examination. He /She must directed to attach a photocopy of this letter with the forwarding letter while submitting thesis to the University along with the letter of approval of University for change of supervisor/Co-Supervisor, change of topic,(if any).

Dr. S P Singh MS(Oph)
Controller of Examinations

Note :

83. *If any discrepancy found regarding topic of thesis or Supervisor/Co-Supervisor, inform undersigned within one month after issue of this letter.*
84. *The student may submit the thesis as per the schedule already conveyed i.e for May/June examination 30th Nov of the preceding the year of examination and for Nov/Dec examinations 31st May of the year of examination.*

EFFECT OF QUALITY IMPROVEMENT INITIATIVE ON UMBILICAL LINE ASSOCIATED BLOOD STREAM INFECTION IN NEONATAL INTENSIVE CARE UNIT

THESIS PROPOSAL

FOR APPROVAL OF SUBJECT OF THESIS TO BE SUBMITTED IN

PARTIAL FULFILMENT OF THE REQUIREMENTS

FOR THE DEGREE OF

MD

In

PAEDIATRICS

OF THE

BABA FARID UNIVERSITY OF HEALTH SCIENCES

FARIDKOT

MARCH, 2021

DR. HIMANI

DEPARTMENT OF PAEDIATRICS
DAYANAND MEDICAL COLLEGE AND HOSPITAL
LUDHIANA

ABSTRACT OF PLAN OF THESIS

TITLE	Effect of Quality Improvement Initiative on Umbilical line associated Blood Stream Infection in Neonatal Intensive Care Unit
DEGREE	MD Paediatrics
NAME OF THE CANDIDATE	Dr. Himani
SUPERVISOR	Dr. Kamaldeep Arora, Associate Professor, Department of Paediatrics, DMC&H, Ludhiana
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INSTITUTION	Dayanand Medical College & Hospital, Ludhiana
UNIVERSITY	Baba Farid University of Health Sciences, Faridkot

Introduction: Umbilical Line Catheterisation is the most common healthcare associated infection in Neonatal Intensive Care Unit imposing significant burden on affected neonate and on healthcare system. Umbilical catheter insertion and stay introduces risk of infection, increased hospitalisation stay and costs Due to many factors in low-resource countries, umbilical line associated blood stream infections (ULABSI) are unaddressed and under-reported.

Aim of Study: To assess the Effects of QI Initiative on ULABSI in Neonatal Intensive Care Unit

Materials & methods: It is a prospective cohort study of 12 months from 1st March, 2021 to 28th February, 2022 in 30 bedded NICU in a tertiary care hospital. Root cause analysis of ULABSI will be done. The study will be conducted in 2 phases in which phase I would be data collection (3 months). Phase II will be intervention period of 9 months.

Clinical Significance: Umbilical line-associated bloodstream infection is one of the most important hospital acquired infection causing significant morbidity and mortality in critically ill patient. Findings from several studies shows that educational intervention of hand hygiene and training on the catheter handling are two most important preventive measures in the reduction of ULABSI.

Keywords: ULABSI, hand hygiene, care bundle, neonatal intensive care unit.

(Signature) Candidate	(Signature) Co-supervisor	(Signature) Co-supervisor	(Signature) Supervisor	(Signature) Principal

CERTIFICATE OF FACILITIES AVAILABLE

This is to certify that the facilities for work on the subject of thesis titled **"EFFECT OF QUALITY IMPROVEMENT INITIATIVE ON UMBILICAL LINE ASSOCIATED BLOOD STREAM INFECTION IN NEONATAL INTENSIVE CARE UNIT"** exist in the Department of Paediatrics, DMC&H, Ludhiana and will be provided to the candidate. We will see that the data being included in the thesis is genuine and is collected by the candidate herself under our supervision and guidance.

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APPROVAL PROFORMA
BY RESEARCH & ETHICAL COMMITTEE
DAYANAND MEDICAL COLLEGE & HOSPITAL,
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Name of candidate	Dr. Himani
Department	Pediatrics
Topic of Thesis	Effect of Quality Improvement Initiative on Umbilical line associated Blood Stream Infection in Neonatal Intensive Care Unit
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Dr. Harpreet Kaur (Professor & Head, Pathology)	Mr. R K Sharma (Legal Expert)
Dr. Jaspal Singh (Professor & Head, Surgery)	Dr. Ramit Mahajan (Associate Professor, Gastroenterology)
Dr. Dinesh Gupta (Professor & Head, Medicine)	Dr. Anu Sharma (Professor, Anatomy)
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Dr. Gurpreet S Wander (Vice Principal)	Dr. Gurpreet S Wander (Vice Principal & Professor & Head, Cardiology)
	Dr. Gagandeep Singh (Secretary, Ethics Committee Professor & Head, Neurology)

Approved: Yes / No

Dr. Sandeep Puri
Chairperson
Research Committee

Approved: Yes / ~~No~~

Prof. Arvind Malhotra
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Ethics Committee

BABA FARID UNIVERSITY OF HEALTH SCIENCES, FARIDKOT

PROFORMA FOR REGISTRATION OF SUBJECT FOR DISSERTATION

1	NAME OF THE CANDIDATE AND ADDRESS	DR. HIMANI
2	NAME OF THE INSTITUTE	Dayanand Medical College and Hospital, Ludhiana
3	COURSE OF STUDY AND SUBJECT	MD Pediatrics
4	DATE OF ADMISSION OF COURSE	25th JULY 2020
5	TITLE OF THE TOPIC	Effect of Quality Improvement Initiative on Umbilical line associated Blood Stream Infection in Neonatal Intensive Care Unit

6. BRIEF RESUME OF THE INTENDED WORK

6.1 NEED FOR THE STUDY

Newborn survival rate has been increased due to many interventions in this vulnerable period [1] but unfortunately due to these interventions the infection rate and morbidity associated with this has gone up. There is urgent need to decrease these iatrogenic infections. One such intervention is Umbilical Line Catheterisation. Umbilical line catheterization utilizes the exposed umbilical stump for central access.[2] In the NICU, it provides an effective route for administration of fluids, drugs, nutritional support and hemodynamic monitoring. At the same time, neonates with umbilical catheters are also at risk of developing infectious complications like local insertion-site infection, umbilical line associated blood stream infection, septic thrombophlebitis, endocarditis and other metastatic infections. Umbilical line associated blood stream infection is a laboratory confirmed blood stream infection occurring in a patient with catheter in place for more than 48 hours that is not related to an infection at any other site.[3] There are many different ways that contamination can occur of the central line and cause a central line-related infection. These include: contamination on insertion, patient's skin flora, healthcare professional accessing the umbilical line, contaminated infusion or components of IV set, hematogenous spread from other sites (e.g. through the bloodstream from another infection) and non-intact dressing. There are patient-related risk factors for developing an umbilical line associated blood stream infection which include: immunosuppression, poor nutrition, impaired skin integrity, multiple invasive procedures, antibiotic therapy and parenteral nutrition.[4] Umbilical line related infections can be either localised or systemic. Symptoms of localised infections include: redness, swelling, discharge at umbilical line site. If localised infection is suspected, a swab can also be taken from the umbilical line site if exudate is present. Symptoms of systemic infection include: fever, hypotension, tachycardia, respiratory distress. All these can lead to severe bacteremia, sepsis and death.[3]

Late-onset sepsis can prolong hospitalization and impair the neurodevelopment and growth of those who survive, which may further increase the risk of associated morbidity, as well as increasing healthcare costs. The impact of the bundle of care approach for reduction of ULABSI has been evidenced by several studies. Hand hygiene is recognized as the most important and cost-effective measure of bundle approach for prevention of all HAIs. Due to the defective hand hygiene practice, microorganisms are often carried by the healthcare worker's hand from the patients or their surroundings and are transmitted to the adjacent patients and their environment during routine procedures.[5] Adherence to the eight steps of the hand hygiene has been evidenced with definite decrease in the infection rate. Notices can be posted at the entrance of the NICU to remind all visitors of the importance of the initial scrub for the day (removal of rings, bracelets and watch, keeping sleeves above elbows, and application of chlorhexidine gluconate 2% to thoroughly wash hands and arms). Catheter care is another important aspect of CLABSI bundle care and often found neglected during routine practices. To achieve good compliance, rate of the care bundles, continuous educational teaching, and training in all the levels of healthcare workers are proven to be very helpful.[6] Findings from several studies shows that educational intervention of hand hygiene and training on the catheter handling are two most important preventive measures in the reduction of ULABSI.[7] The evidence of care bundle in preventing infections is known, despite of this, implementation of care bundle is a challenge and hence quality improvement (QI) principles are needed to bridge this know-do gap.[8] To study the impact of implementation of hand hygiene and care bundle, this study was planned in NICU with objective to decrease the ULABSI rate.

6.2 REVIEW OF LITERATURE

Umbilical line-associated blood stream infections (ULABSI) contribute considerably to nosocomial sepsis in a tertiary NICU. Various aspects of the central line care have been shown to decrease the incidence of line related infections, however, care bundle approach has been shown to have the highest yield.[8-10]

Balla, *et al*. Decreasing Central Line-associated Bloodstream Infections through quality improvement initiative. PDSA cycles were conducted. The process indicators were based on hand hygiene (30 audits per month) and central line care audits (10 audits per month). If all the steps of hand hygiene including the six core steps and the duration were correctly performed, it was considered 'overall compliant to HH'. The central line care audits focused on insertion practices (number of central lines inserted by eligible Healthcare Personnel (HCP), checklist analysis) and maintenance practices (breaks in circuit, 2 HCPs handling the central line, scrubbing the hub for 15 seconds, 2% chlorhexidine used for scrub, use of single lumen central line and needleless connectors). Results were 89% reduction in CLABSI from the baseline rate of 31.7 to 3.5 per 1000 line-days and overall mortality showed a reduction from 2.9% to 1.7 %. As per this study, the HH overall compliance rates increased from 0% to around 50%. The compliance rates measured in study are lower than that quoted from other studies. The 0% overall compliance was intriguing as the HH compliance in NICU as monitored by the hospital infection control committee (HICC) team was always >85%.[8]

Hussain ASS, Ali SR, Ariff S*, et al* , A protocol for quality improvement programme to reduce central line-associated bloodstream infections in NICU of low and middle income country. Inclusion criteria was all patients admitted to NICU from 1 January 2016 to 31 December 2017, who have central line in place. The study was conducted using preanalysis and postanalysis design from January 2016 to December 2017. It was conducted in three phases with phase I being the preimplimentation phase where retrospective data was collected. Phase II, implementation phase, where the CLABSI prevention

package was introduced and phase III was follow-up to see the impact. Primary outcome was reduction in CLABSI rates. To compare the effect of intervention, they used independent sample t-test for continuous outcomes, whereas X2 test was used for categorical outcomes. Relative risk ratios, 95% CIs and p values were determined for all outcomes. Probability values >0.05 using two sided tests was considered significant. Incidence density was calculated and Poisson regression was used to determine factors associated with incidence of CLABSI. Microbiological profiles and their antimicrobial resistance pattern were reported as pan sensitive, MDRO and CRO. They followed evidence based CLABSI prevention package (Hand washing and use of chlorhexidine). This study demonstrates 47.6% decrease in the CLABSI rate in the post-intervention period in comparison to the pre-intervention period. The decrease in the rate was also found in all the ICUs.[11-13]

Dheer G, Chaudhry GK, Singh T. Immediate complications of percutaneous central venous cannulation in children. This study shows that the immediate complications, namely pneumothorax, hydrothorax and subcutaneous extravasation, were noticed only in neonates at a rate of 1.5% each. Both pneumothorax and extravasation developed in the hemodynamically unstable patients (complication rate of 2.9%) while hydrothorax developed in the hemodynamically stable neonate (complication rate of 3.3%). Similarly, pneumothorax developed in a patient with ventilatory support (complication rate of 2.4%) while hydrothorax and extravasation developed in patients with spontaneous breathing (complication rate of 4.3%). Also, none of the cases of pneumothorax, hydrothorax and extravasation developed in neonates in whom catheterization was achieved in single attempt. In case of hydrothorax and extravasation (complication rates of 8.3%), catheterization was achieved in two attempts while multiple attempts at catheterization were made in case of pneumothorax (complication rate of 4.2%). No mortality was directly attributed to the percutaneous central venous catheter.[14-16]

Bell T, O'Grady NP, Prevention of Central Line-Associated Bloodstream Infections. The findings were as follows: - three months from the beginning of the intervention, the median rate of catheter related BSI had decreased from 2.7 infections per 1000 catheter-days to 0 (p = <0.002). The regression model showed a significant decrease in infection rates from baseline, with incidence-rate ratios continuously decreasing from 0.62 (95% confidence interval [CI], 0.47 to 0.81) at 0 to 3 months after implementation of the intervention to 0.34 (95% CI, 0.23 to 0.50) at 16 to 18 months. Overall, a sustained reduction of 66% was observed—emphasizing the importance of these basic measures in preventing CRBSI. In a retrospective study investigating the introduction of disinfection cap, CLABSI rates dropped from 1.682/1000 catheter days to 0.6461/1000 catheter days after implementing disinfection caps, achieving statistical significance. In an observational study in an oncology unit, a total of 3,005 catheter-days and 1 CLABSI (0.3 infections/1,000 catheter-days) were documented during an intervention period where alcohol-impregnated port-protectors were introduced, compared with 6,851 catheter-days and 16 CLABSIs (2.3 infections/1,000 catheter-days) during the control period (RR, 0.14; 95% CI, 0.02–1.07; p = .03). As an effective antiseptic method that does not rely on active human intervention, disinfection caps are an attractive way to complement a comprehensive CLABSI reduction strategy. The study concluded that preventing CLABSIs in the ICU usually requires multiple strategies. Insertion strategies including education and training of those who insert catheters, use of chlorhexidine for skin antisepsis, and use of maximal sterile barrier precautions have a long record of preventing CLABSI. Use of novel technologies such as antibiotic or antiseptic impregnated catheters, sutureless securement devices, and disinfection caps should be added to the armamentarium of tools to further reduce CLABSI rates.[17,18]

Mohapatra S, Kapil A, Suri A, et al. Impact of Continuous Education and Training in Reduction of Central Line-associated Bloodstream Infection in Neurointensive Care Unit. Central line-associated

bloodstream infection is one of the most important DAI causing significant morbidity and mortality in critically ill patient. Their findings support that continuous educational intervention of hand hygiene with and training on the catheter hub care are two most important preventive measures in the reduction of CLABSI incidence. The study was conducted from January 1, 2017 to December 31, 2017. Data compilation and analysis of the CLABSI rate, central line catheter days, and the device utilization ratio (DUR) were done during this period. Also, an evaluation based on the practices followed up routinely by the nursing staff for the insertion and maintenance bundle of care was also collected and analyzed. The quality improvement (QI) initiative achieved a 48% reduction in the CLABSI rate from the baseline rate of 8.7 to 4.5 per 1000 catheter days. The overall mortality showed a reduction from 1.5 to 0.05% during the post-intervention period. There was a significant improvement in compliance with the hand hygiene practice and catheter hub care in the post-intervention period. This study demonstrates adherence to hand hygiene and catheter hub care with continuous teaching, training, and supervision was highly effective in reducing the CLABSI rate.[19]

Holton, Donna et al. “Central venous catheter-associated bloodstream infections occurring in Canadian intensive care units: A six-month cohort study. This was a prospective, active six-month cohort with a nested case-control study conducted in forty-one ICUs located in 19 Canadian hospitals. Data were collected using a standardized format on all CVCs and patients when a CVC was inserted for more than 48 h. Results of microbiological studies and therapeutic interventions were recorded when a BSI occurred. There were 182 BSIs from 3696 CVC insertions in 2531 patients. Coagulase-negative staphylococci were responsible for 73% of the BSIs. Mean rates of CVC-associated BSIs per 1000 CVC days were 6.9, 6.8 and 5.0 in adult, neonatal and pediatric ICUs, respectively. Significant factors associated with BSI included duration of CVC insertion (OR=1.2, 95% CI 1.1 to 1.3), receiving total parenteral nutrition (OR=4.1, 95% CI 1.2 to 14.3) and having one or more CVCs (OR=3.1, 95% CI 1.5 to 6.5). In the case-

control study, 80% of the variance in a backward elimination logistic regression analysis was explained by duration of CVC insertion (OR=1.2 per day), receiving chemotherapy (OR=6.1), more than one CVC insertion during the study (OR=3.5), insertion of a CVC with two or more lumens (OR=2.3), using the CVC to administer total parenteral nutrition (OR=1.6) and having a surgical wound other than a clean wound (OR=1.6). The present study identified risk factors explaining 80% of the variance associated with BSIs and is one of the largest reports on the rate of CVC-associated BSIs occurring in the ICU setting.[20]

Schulman J, Stricof R, Stevens TP, Horgan M, Gase K, Holzman IR, et al. Statewide NICU central-line associated bloodstream infection rates decline after bundles and checklists. This was a prospective cohort study that enrolled all neonates with a central line who were hospitalized in any of 18 NICUs. Each NICU reported CLABSI and central-line utilization data and checklist use. We used χ^2 to compare CLABSI rates in the preintervention (January to December 2007) versus the postintervention (March to December 2009) periods and Poisson regression to model adjusted CLABSI rates. Each study period included more than 55 000 central-line days and more than 200 000 patient-days. CLABSI rates decreased 67% statewide (risk ratio: 0.33 [95% confidence interval: 0.27–0.41]; $P < .0005$); after adjusting for the altered central-line–associated bloodstream infection definition in 2008, by 40% (risk ratio: 0.60 [95% confidence interval: 0.48–0.75]; $P < .0005$). A total of 13 of 18 NICUs reported using maintenance checklists for 10% to 100% of central-line days. The checklist-use rate was associated with the CLABSI rate (coefficient: −0.57, $P = .04$). A total of 10 of 18 NICUs were independent CLABSI rate predictors, ranging from 1 site with greatly reduced risk (incidence rate ratio: 0.04, $P < .0005$) to 1 site with greatly increased risk (incidence rate ratio: 2.87, $P < .0005$). Although standardizing central-line care elements led to a significant statewide decline in NICU CLABSIs, site of care remains an independent risk factor. Using maintenance checklists reduced CLABSIs. [21]

Batalden, P. B., & Davidoff, F. (2007). What is "quality improvement" and how can it transform healthcare? Quality & safety in health care. The proposed definition is the combined and unceasing efforts of everyone—healthcare professionals, patients and their families, researchers, payers, planners and educators—to make the changes that will lead to better patient outcomes (health), better system performance (care) and better professional development. Acquiring these five kinds of knowledge requires both scientific and experiential learning. Reflection on the nature of these five knowledge systems, how they grow and change, and the ways in which they work together to move evidence into practice will be essential if we are going to learn about learning. Doing so will generate a kind of ‘‘metaknowledge’’ that will be essential over the long run in becoming progressively better at improvement.[22]

6.3 AIMS AND OBJECTIVES OF THE STUDY

1. To study the effect of quality improvement on umbilical line associated blood stream infection
2. To study factors causing umbilical line associated infections.

7. MATERIALS AND METHODS

Study site- The study would be carried out in the NICU of the Department of Pediatrics, Dayanand Medical College and Hospital, Ludhiana.

7.1 Source of Data

A prospective cohort study will be done on neonates having umbilical line in situ in Neonatal intensive care unit.

7.2 METHOD OF COLLECTION OF DATA

Inclusion Criterion

- Neonate admitted in NICU in whom umbilical line is inserted during the NICU stay
- Death after 48 hours of umbilical line insertion.

Exclusion Criterion

- Neonates with major anomalies for example: - chromosomal anomaly, Arnold Chiari syndrome, Pierre Robin syndrome.

Duration of Study/ Number of Cases

12 Months

Outcome

Umbilical line related Blood Stream Infection rates following implementation of Quality Improvement initiative.

Statistical Analysis (Name of the method in plan)

- Prospective cohort study in 30 bedded NICU in tertiary care hospital from 1st March, 2021 to 28th February, 2022.
- Data will be described in terms of range; mean ± standard deviation (± SD), median, frequencies (number of cases) and relative frequencies (percentages) as appropriate. All statistical calculations will be done using (Statistical Package for the Social Science) SPSS 21version (SPSS Inc., Chicago, IL, USA) statistical program for Microsoft Windows.

An umbilical line associated bloodstream infection (ULABSI) is defined as a laboratory-confirmed bloodstream infection not related to an infection at another site that develops within 48 hours of central line placement.

A QI Team will be formed involving doctors (from department of neonatology, microbiology), NICU nurses and ICN from pediatrics department. Root cause analysis will be done for ULABSI in the unit. Various causes of ULABSI will be identified based on which a QI initiative focusing on Hand Hygiene (HH) and Care Bundle approach (mainly personnel training) to line care will be conducted. A healthcare bundle is defined as a small, straightforward set of evidence-based practices that, when performed collectively and reliably, have been proven to improve patient outcomes. A laboratory-confirmed bloodstream infection that is not secondary to an infection at another site would be considered as a BSI. Blood cultures that are positive on admission and those reported as contaminants will not be included. The study will be conducted in 2 phases in which phase I would be data collection (duration 3 months). Phase II will be intervention period of 9 months which includes staff education, standardization of skin preparation protocol, introduction of new antiseptic agents, implementation of umbilical catheter insertion and maintenance checklists, reinforcement of the use of maximal sterile barrier precautions, and revision of the umbilical catheter configuration and maintenance protocols.

7.3 DOES THE STUDY REQUIRE ANY INVESTIGATIONS OR INTERVENTIONS TO BE CONDUCTED ON PATIENTS OR OTHER HUMANS OR ANIMALS? IF SO, PLEASE DESCRIBE BRIEFLY.

No.

7.4 HAS ETHICAL CLEARANCE BEEN OBTAINED FROM YOUR INSTITUTION IN CASE OF 7.3?

Attached herewith

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PROFORMA

PHASE I

Name of patient _____Age/Gender_____Gest. Age _____.

MRD No_____Address_____.

Date of insertion of umbilical line_____Time taken _____Duration of umbilical

Line stay_____._____Date of removal_____ DOA_____._____DOD_____.

Diagnosis_____.

Umbilical line inserted by: Consultant/ Fellow/ Senior Resident/ Junior Resident

Indication of insertion of umbilical line: Prematurity/ Inotropic support/ IBP Monitoring/ Mechanical Ventilation

Antenatal problems _____

Type of delivery_____.

Asphyxia: Yes/ No

Cry: Immediate/ Delayed/ No

Feeding:- Expressed Breast Milk/ Formula Feeds

Period of mechanical ventilation:

ROP:

BPD:

ANTHROPOMETRY

		EXPECTED	CENTILES
WEIGHT			
HEIGHT			
HC			

Signature of Candidate

Signature of Supervisor

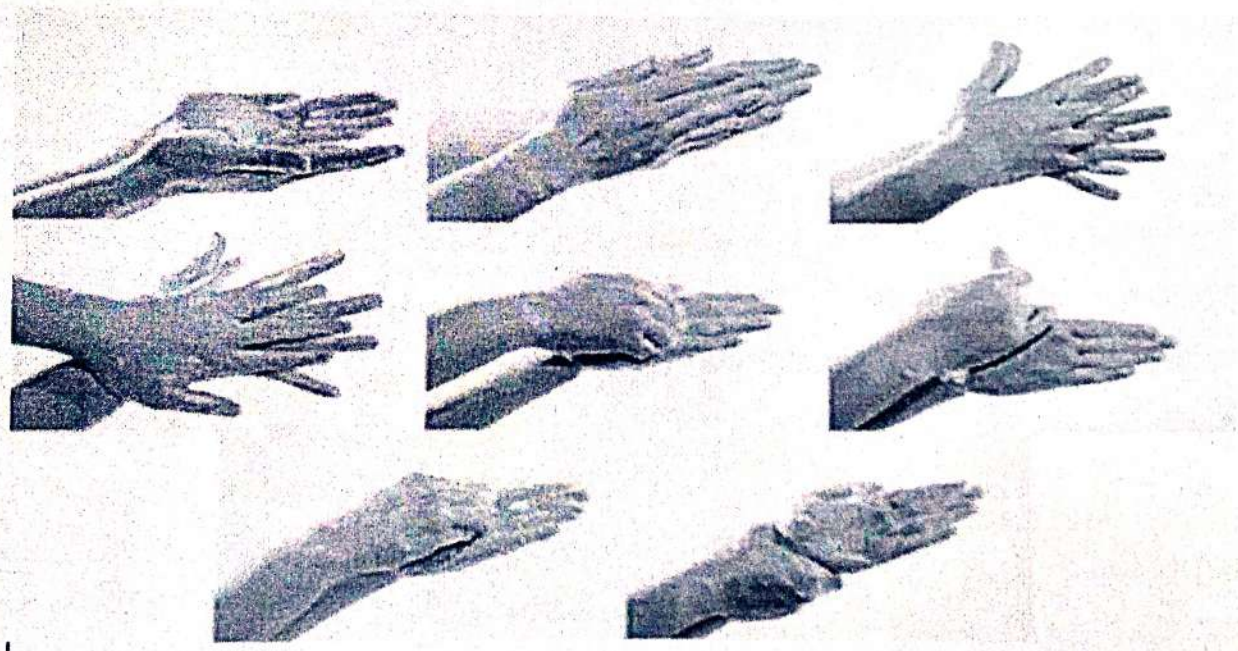
PROFORMA

INVESTIGATIONS

Hb									
TLC									
Platelet									
CRP									
PCT									
Blood culture:-									
Umbilical catheter tip culture:-									

PROCEDURE CHECKLIST

1. Proper hand washing with antiseptic soap prior to procedure. ☐ Y ☐ N



2. Are maximal barriers being used?
(Maximal barriers = long-sleeved sterile surgical gown, sterile gloves, mask, and large sterile drape) ☐ Y ☐ N

3. Is chlorhexidine 2% being used for cleaning? ☐ Y ☐ N

4. Is the line inserted aseptically?

- Proper size of catheter inserted ☐ Y ☐ N
- Back flow checked ☐ Y ☐ N

5. Is there a break in sterility by the assistant? ☐ Y ☐ N

6. Is there any break in sterility during/throughout the insertion? ☐ Y ☐ N

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Signature of Supervisor

7. Is the line(s) sutured/taped before x-ray? ☐ Y ☐ N

8. Is there a break in sterility while waiting for x-ray? ☐ Y ☐ N

9. Are fluids/tubings being attached to hub aseptically? ☐ Y ☐ N

10. Did the person (usually the nurse) attaching the fluids wash his/her hands before doing so? ☐ Y ☐ N

11. Are there any unnecessary ports/pig tails added? ☐ Y ☐ N

12. Is there a port designated for TPN? ☐ Y ☐ N

13. Is the line dressed with transparent dressing aseptically? ☐ Y ☐ N

MAINTENANCE CHECKLIST

1. Wash hands prior to touching the line (for hands on assessment) ☐ Y ☐ N

2. Assess system: Closed system; all connections are tight and secure? ☐ Y ☐ N

3. Is line being accessed aseptically via med port? ☐ Y ☐ N
   a. Swab med port on T piece prior to accessing line ☐ Y ☐ N
   b. scrubbing up and down on the IV tubing and line? ☐ Y ☐ N
   c. How long is med port scrubbed for? ☐ Y ☐ N
   d. Does the nurse wait for the port to dry after swabbing before accessing? ☐ Y ☐ N

4. Is the line being placed away from potential areas of contamination e.g., ostomy bag & diaper? ☐ Y ☐ N

5. Is the umbilical line dressing changed routinely? ☐ Y ☐ N

6. Does the nurse wash hands after she completes her assessment/handling? ☐ Y ☐ N

OUTCOME

- Discharge
- DOR
- DAMA
- Death

Signature of Candidate

Signature of Supervisor

PROFORMA

PHASE II

Name of patient _____Age/Gender_____Gest. Age _____

MRD No_____Address_____.

Date of insertion of umbilical line_____Time taken _____Duration of umbilical

Line stay_____Date of removal_____ DOA_____DOD_____.

Diagnosis_____.

Umbilical line inserted by: Consultant/ Fellow/ Senior Resident/ Junior Resident

Indication of insertion of umbilical line: Prematurity/ Inotropic support/ IBP Monitoring/ Mechanical Ventilation

Antenatal problems _____

Type of delivery_____.

Asphyxia: Yes/ No

Cry: Immediate/ Delayed/ No

Feeding:- Expressed Breast Milk/ Formula Feeds

Period of mechanical ventilation:

ROP:

BPD:

ANTHROPOMETRY

		EXPECTED	CENTILES
WEIGHT			
HEIGHT			
HC			

Signature of Candidate

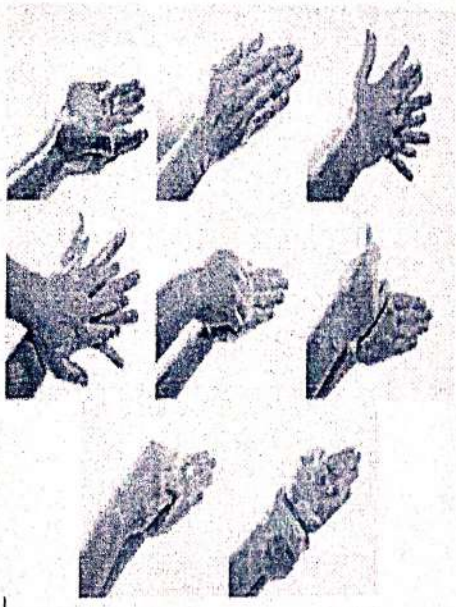
Signature of Supervisor

PROFORMA

INVESTIGATIONS

Hb									
TLC									
Platelet									
CRP									
PCT									
Blood culture:-									
Umbilical catheter tip culture:-									

PROCEDURE CHECKLIST

	Done	Done After Reminder
Wash hands • Correct number of steps  • Adequate time for Hand Hygiene		
Assemble equipment/verify supplies		
Inform Radiology		
Assess, cleanse the site		
Position patient correctly for procedure		
Wear sterile gown and gloves		

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v

PROFORMA

Drape a large area exposing ONLY site		
Prepare site with 2% chlorhexidine/4% alcohol solution		
Prepare site for 30 seconds		
Dry for up to 60 seconds without fanning/wiping		
Maintain sterile field throughout procedure		
Did the assistant follow the same precautions? (Hand washing, mask, gloves and gown)		
Was sterility maintained when applying dressing/ stitches?		
Was sterile field compromised during line readjustment?		
Were IV fluids/lines being attached aseptically?		
Is the umbilical line dressing changed routinely?		

CENTRAL LINE INSERTION CART

TOP SHELF	
Sterile Towels	
Sterile Gowns	
Caps (in plastic bag)	
Masks	
BOTTOM SHELF	
UAC Trays	
#6 Fr. Single Lumen Umbilical line	
#5 Fr. Single Lumen Umbilical line	
#3.5 Fr. Single Lumen Umbilical line	
DRAWERS	
Sterile Gloves	
Measuring Tape	
0.9% NaCl Vial	
0.9% NaCl Pre-filled Syringe Package	
5mL Syringe	
10mL Syringe	
Needles (22G, 27G)	
Catheter Introducer (22G, 24G)	
4"x4" Gauze	
2"x2" Gauze	

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#3.0 Silk Suture	
Sterile Scissors and Tweezers set	
IV Extension Set	
Thrombostat Dressing Pack	
Tegaderm small (4.4cm x 4.4cm)	
Tegaderm medium (6cm x 7cm)	
Tegaderm large (10cm x 12cm)	
Clamps, non-tooth, non-sterile	
Alcohol for cleaning cart top	
Tapes	

OUTCOME

- Discharge
- DOR
- DAMA
- Death

Signature of Candidate

Signature of Supervisor

PATIENT'S PARENT/GUARDIAN CONSENT FORM

Date: ____/____/____

I .....F/o, M/o ..... R/o ..... am willing to let my child participate in the study entitled Bed **"EFFECT OF QUALITY IMPROVEMENT INITIATIVE ON UMBILICAL LINE ASSOCIATED BLOOD STREAM INFECTION IN NEONATAL INTENSIVE CARE UNIT"**. The procedure with its complications has been explained to me in local vernacular language. I have fully understood that no special tests and extra expenditure in any form, merely for the purpose of thesis is being carried out. I am free to opt out the study any time without assigning any reason. This will not affect my treatment and investigation of my child.

Signature of the Witness
Name:

Signature/Thumb Impression of guardian
Name:

Signature of the Supervisor

Signature of Candidate

ਮਰੀਜ ਦੇ ਮਾਤਾ/ਪਿਤਾ ਦਾ ਰਜ਼ਾਮੰਦੀ ਫਾਰਮ

ਮਿਤੀ __/___/____

ਮੈਂ _____ ਪਿਤਾ/ਮਾਤਾ _____,

ਵਾਸੀ _____

ਆਪਣੇ ਬੱਚੇ ਦੇ ਇਸ ਅਧਿਐਨ ਵਿੱਚ ਹਿੱਸਾ ਲੈਣ ਤੇ ਰਜ਼ਾਮੰਦ ਹਾਂ। ਇਸ ਖੋਜ ਕੰਮ ਵਿੱਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਮੈਂ ਆਪਣੀ ਮਰਜ਼ੀ ਨਾਲ ਤਿਆਰ ਹਾਂ। ਮੈਂ ਇਹ ਦਸਣਾ ਚਾਹੁੰਦਾ/ਚਾਹੁੰਦੀ ਹਾਂ ਕਿ ਇਹ ਰਜ਼ਾਮੰਦੀ ਦੇਣ ਵਾਸਤੇ ਮੈਨੂੰ ਕਿਸੇ ਵੀ ਤਰ੍ਹਾਂ ਦਾ ਲੋਭ-ਲਾਲਚ ਨਹੀਂ ਦਿੱਤਾ ਗਿਆ ਅਤੇ ਨਾ ਹੀ ਕੋਈ ਦਬਾ ਪਾਇਆ ਗਿਆ ਹੈ। ਮੈਨੂੰ ਇਸ ਖੋਜ ਦਾ ਮਨੋਰਥ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂੰ ਇਹ ਭਰੋਸਾ ਦਵਾਇਆ ਗਿਆ ਹੈ ਇਹ ਖੋਜ ਵਿਗਿਆਨ ਅਤੇ ਮਾਨਵਤਾ ਦੀ ਭਲਾਈ ਲਈ ਹੈ। ਮੈਨੂੰ ਇਸ ਖੋਜ ਵਿੱਚ ਹੋਣ ਵਾਲੇ ਖਤਰੇ ਬਾਰੇ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆਂ ਹੈ ਅਤੇ ਮੈਨੂੰ ਇਹ ਯਕੀਨ ਹੈ ਕਿ ਇਹ ਖਤਰਾ ਬਹੁਤਾ ਮਾਮੂਲੀ ਹੈ। ਮੈਨੂੰ ਇਸ ਖੋਜ ਕੰਮ ਵਿੱਚ ਹਿੱਸਾ ਲੈਣ ਦਾ ਢੰਗ-ਤਰੀਕਾ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ।

ਮੈਂ ਇਸ ਖੋਜ ਕੰਮ ਵਿੱਚ ਹਿੱਸਾ ਲੈਣ ਬਾਰੇ ਆਪਣੀ ਰਜ਼ਾਮੰਦੀ ਕਿਸੇ ਵੀ ਸਮੇਂ ਵਾਪਸ ਲੈ ਸਕਦਾ/ਸਕਦੀ ਹਾਂ ਅਤੇ ਮੇਰੀ ਰਜ਼ਾਮੰਦੀ ਵਾਪਸ ਲੈਣ ਦਾ ਮੇਰੇ ਬੱਚੇ ਦੇ ਇਲਾਜ ਤੇ ਕੋਈ ਅਸਰ ਨਹੀਂ ਹੋਵੇਗਾ।

_____ _____

ਗਵਾਹ ਦੇ ਹਸਤਾਖਰ ਮਰੀਜ਼ ਦੇ ਹਸਤਾਖਰ

ਮਿਤੀ _____ ਮਿਤੀ _____

ਪਤਾ _____ ਪਤਾ _____

_____ _____

ਨਰੀਖਕ ਦੇ ਹਸਤਾਖਰ ਸਿਖਿਆਰਥੀ ਦੇ ਹਸਤਾਖਰ

मरीज के माता/पिता का अनुमति फार्म

तिथि ___/___/___

मैं _____ पिता/माता/_____ वासी _____, अपने बच्चे के इस शोधकार्य में भाग लेने के लिए सहमत हूँ। मैं इस शोधकार्य में भाग लेने के लिए अपनी स्वेच्छा से तैयार हूँ। मैं पुष्टि करता/करती हूँ कि स्वीकृत देने के लिए मुझे कोई आर्थिक प्रलोभन नहीं दिया गया और न ही दबाव डाला गया है। मुझे इस शोधकार्य का उद्देश्य स्पष्ट कर दिया गया है और मुझे यह विश्वास है कि यह विज्ञान और मानवता के लाभ के लिए है। मुझे इस शोधकार्य में होने वाले जोखिम के बारे में समझा दिया गया है और मेरी समझ में यह जोखिम बहुत मामूली है।

मैं इस शोधकार्य में भाग लेने के सम्बन्ध में किसी भी समय अपनी अस्वीकृति व्यक्त कर सकता/सकती हूँ और मेरे अस्वीकृति व्यक्त करने का मेरे बच्चे के इलाज पर कोई प्रभाव नहीं पड़ेगा।

_____ गवाह के हस्ताक्षर

_____ मरीज के माता/पिता के हस्ताक्षर

तिथि _____

पता _____

_____

_____

_____ नरीक्षक के हस्ताक्षर

_____ प्रत्याक्षी के हस्ताक्षर